AD-A133 512 OPERATION AND MAINTENANCE 9-FOOT NAVIGATION CHANNEL UPPER MISSISSIPPI RIV..(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT AUG 74 1/7

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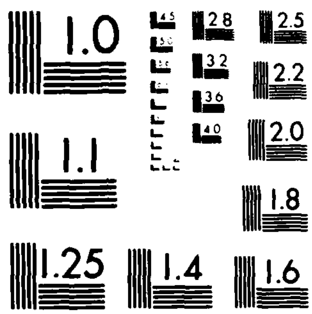

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

PHOTOGRAPH THIS SHEET

AD-A133 512

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INVENTORY

FINAL ENVIRONMENTAL IMPACT STATEMENT, OPERATION AND MAINTENANCE 9-FOOT NAVIGATION CHANNGEL, UPPER MISSISSIPPI RIVER HEAD OF NAVIGATION TO GUTTENBERG, Iowa. Volume II: Exhibits.

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MISSISSIPPI RIVER
ENVIRONMENTAL IMPACT ASSESSMENT
NAVIGATION
CHANNELS (WATERWAYS)
DREDGING

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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FINAL
ENVIRONMENTAL IMPACT STATEMENT

E X H I B I T S

OPERATION AND MAINTENANCE
9-FOOT NAVIGATION CHANNEL
UPPER MISSISSIPPI RIVER
HEAD OF NAVIGATION TO GUTTENBERG, IOWA

Prepared by
U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
August 1974

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LETTERS OF COMMENT

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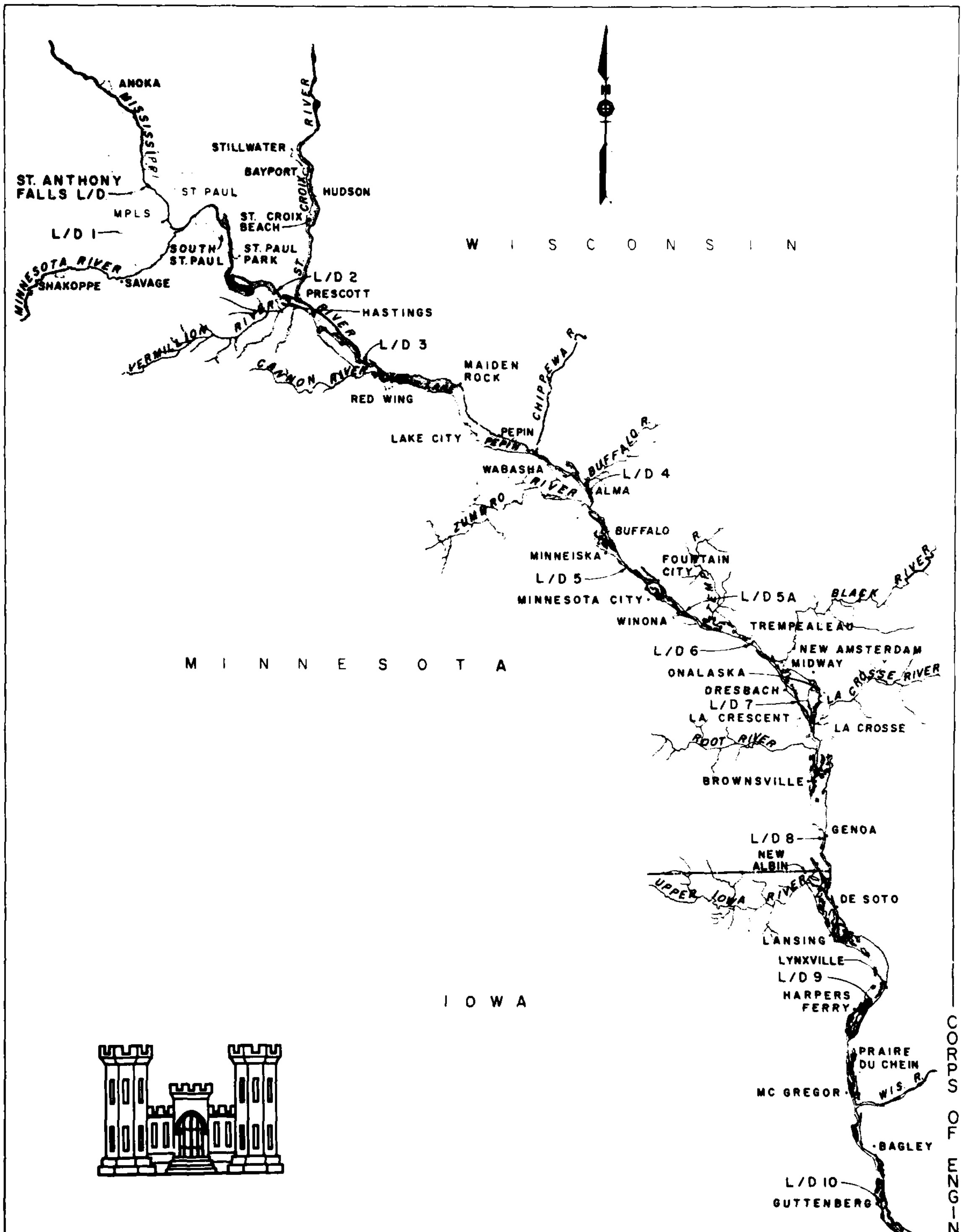

LOCATION OF 9-FOOT CHANNEL NAVIGATION PROJECT

CORPS OF ENGINEERS

ST. PAUL DISTRICT

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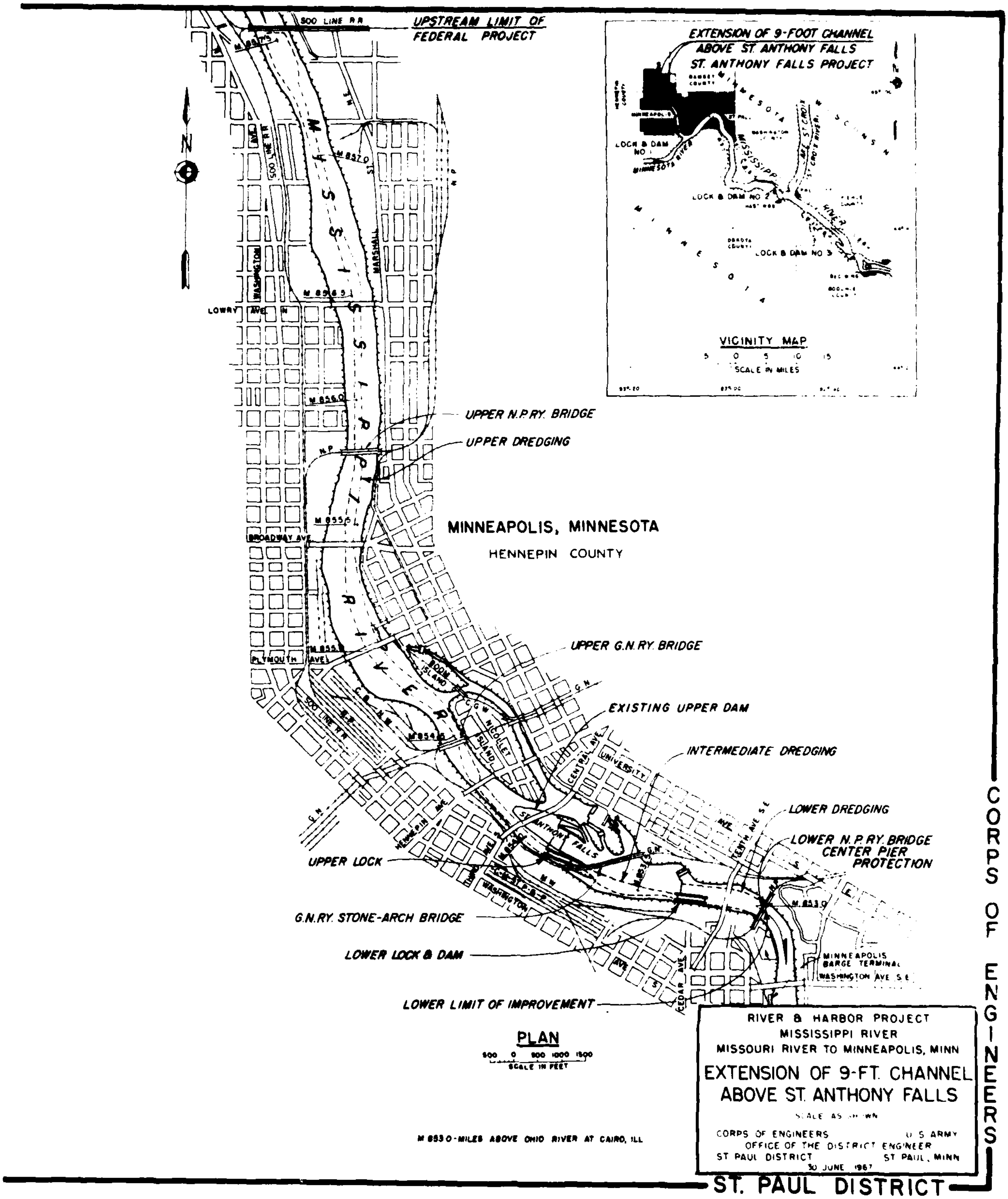
UPSTREAM LIMIT OF FEDERAL PROJECT
EXTENSION OF 9-FOOT CHANNEL ABOVE ST. ANTHONY FALLS
ST. ANTHONY FALLS PROJECT
VICINITY MAP
SCALE IN MILES
LOCK & DAM NO 1
LOCK & DAM NO 2
LOCK & DAM NO 3
UPPER N.P. RY. BRIDGE
UPPER DREDGING
MINNEAPOLIS, MINNESOTA
HENNEPIN COUNTY
UPPER G.N. RY. BRIDGE
EXISTING UPPER DAM
INTERMEDIATE DREDGING
LOWER DREDGING
LOWER N.P. RY. BRIDGE CENTER PIER PROTECTION
UPPER LOCK
G.N. RY. STONE-ARCH BRIDGE
LOWER LOCK & DAM
LOWER LIMIT OF IMPROVEMENT
PLAN
SCALE IN FEET
M 853.0-MILES ABOVE OHIO RIVER AT CAIRO, ILL.
MINNEAPOLIS BARGE TERMINAL
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN
EXTENSION OF 9-FT. CHANNEL
ABOVE ST. ANTHONY FALLS
CORPS OF ENGINEERS U.S. ARMY
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ST PAUL DISTRICT ST PAUL, MINN
30 JUNE 1967
CORPS OF ENGINEERS
ST. PAUL DISTRICT

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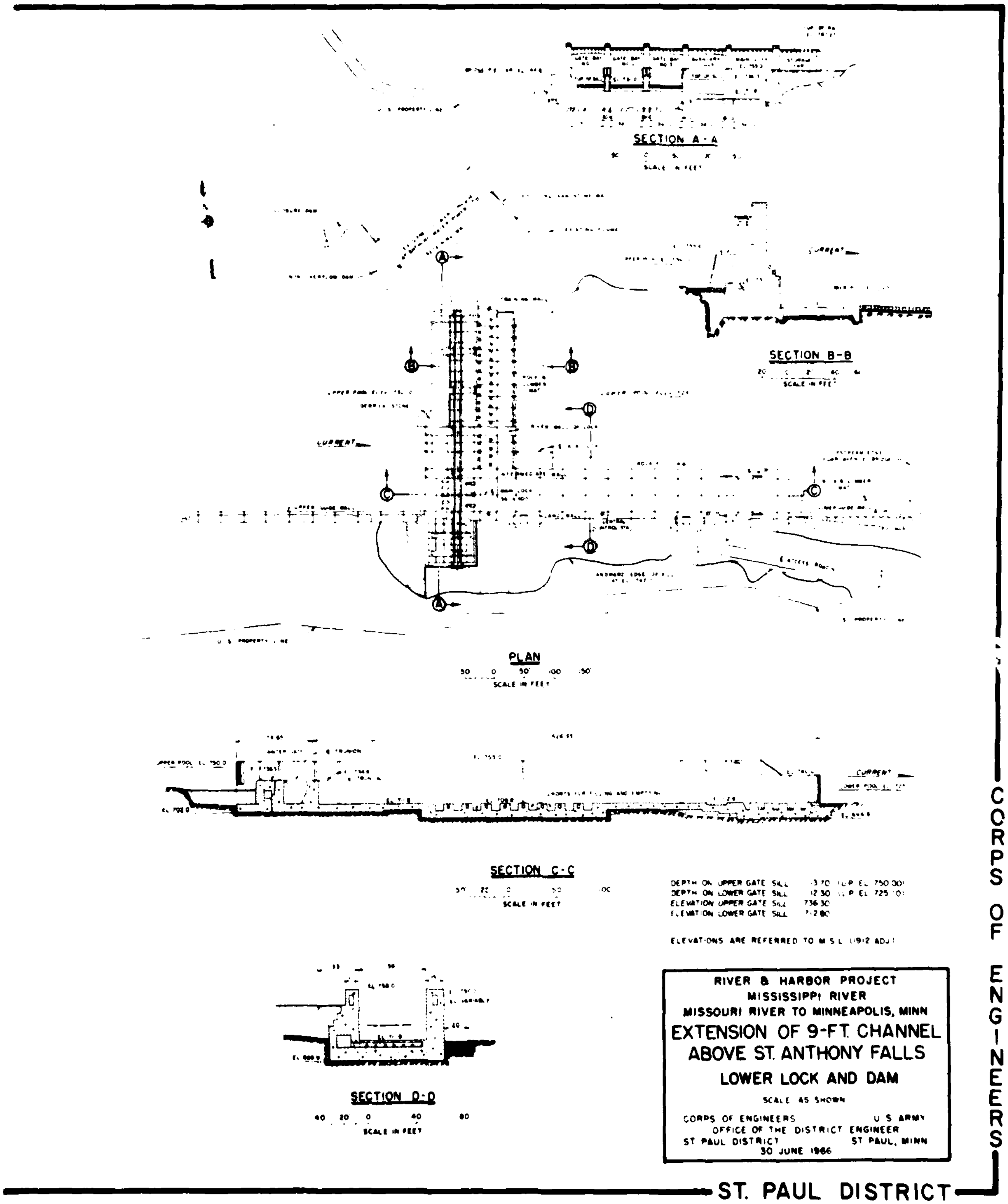
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SCALE IN FEET
SECTION B-B
SCALE IN FEET
CURRENT
PLAN
SCALE IN FEET
SECTION C-C
SCALE IN FEET
DEPTH ON UPPER GATE SILL
DEPTH ON LOWER GATE SILL
ELEVATION UPPER GATE SILL
ELEVATION LOWER GATE SILL
ELEVATIONS ARE REFERRED TO M.S.L. (1912 ADJ)
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MISSOURI RIVER TO MINNEAPOLIS, MINN
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LOWER LOCK AND DAM
SCALE AS SHOWN
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ST. PAUL DISTRICT

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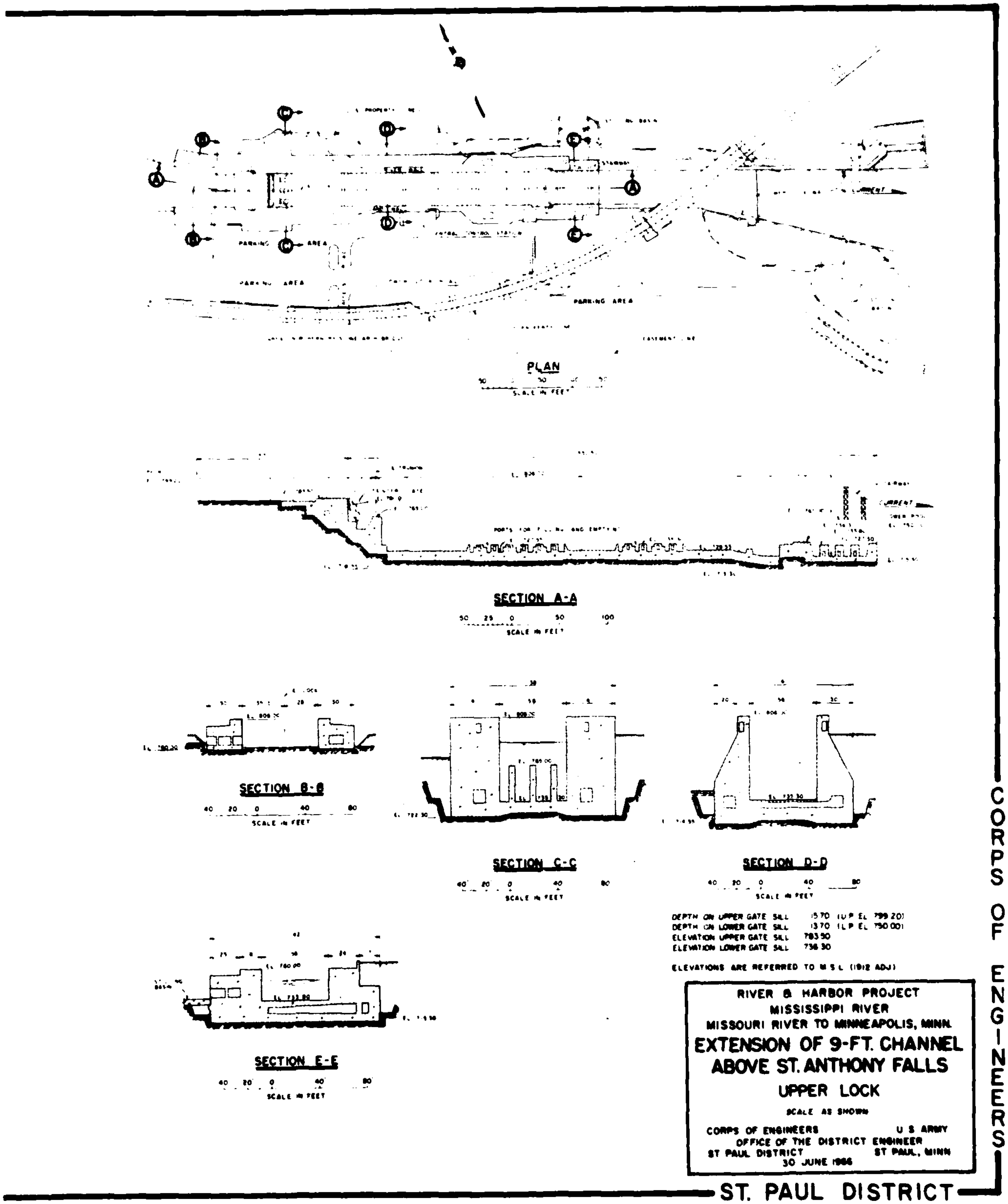

PLAN
SCALE IN FEET
SECTION A-A
SCALE IN FEET
SECTION B-B
SCALE IN FEET
SECTION C-C
SCALE IN FEET
SECTION D-D
SCALE IN FEET
DEPTH ON UPPER GATE SILL 15.70 (U.P. EL. 799.20)
DEPTH ON LOWER GATE SILL 13.70 (L.P. EL. 750.00)
ELEVATION UPPER GATE SILL 783.50
ELEVATION LOWER GATE SILL 736.30
ELEVATIONS ARE REFERRED TO M.S.L. (1912 ADJ.)
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EXTENSION OF 9-FT. CHANNEL
ABOVE ST. ANTHONY FALLS
UPPER LOCK
SCALE AS SHOWN
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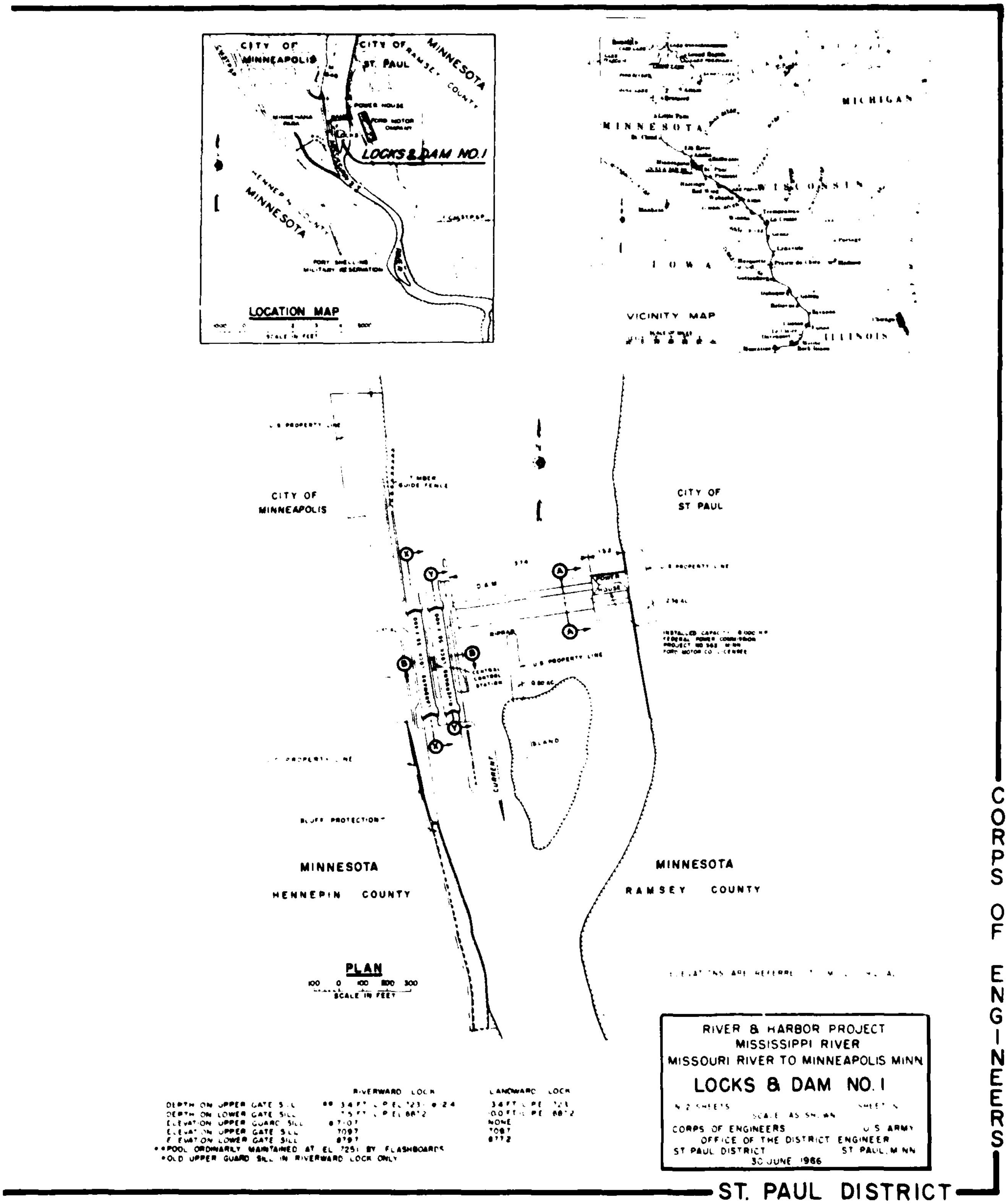

CITY OF MINNEAPOLIS
CITY OF ST. PAUL
MINNESOTA
RAMSEY COUNTY
POWER HOUSE
FORD MOTOR COMPANY
LOCKS & DAM NO. I
HENNEPIN COUNTY
MINNESOTA
FORT SNELLING MILITARY RESERVATION
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MINNESOTA
WISCONSIN
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U.S. PROPERTY LINE
TIMBER GUIDE FENCE
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CITY OF ST PAUL
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CENTRAL CONTROL STATION
ISLAND
CURRENT
BLUFF PROTECTION
MINNESOTA
HENNEPIN COUNTY
MINNESOTA
RAMSEY COUNTY
PLAN
100 0 100 200 300
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RIVERWARD LOCK
LANDWARD LOCK
DEPTH ON UPPER GATE SILL
DEPTH ON LOWER GATE SILL
ELEVATION UPPER GUARD SILL
ELEVATION UPPER GATE SILL
ELEVATION LOWER GATE SILL
**POOL ORDINARILY MAINTAINED AT EL 725.1 BY FLASHBOARDS
*OLD UPPER GUARD SILL IN RIVERWARD LOCK ONLY
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS MINN
LOCKS & DAM NO. I
SCALE AS SHOWN
CORPS OF ENGINEERS
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ST PAUL, MINN
30 JUNE 1986
CORPS OF ENGINEERS
ST. PAUL DISTRICT

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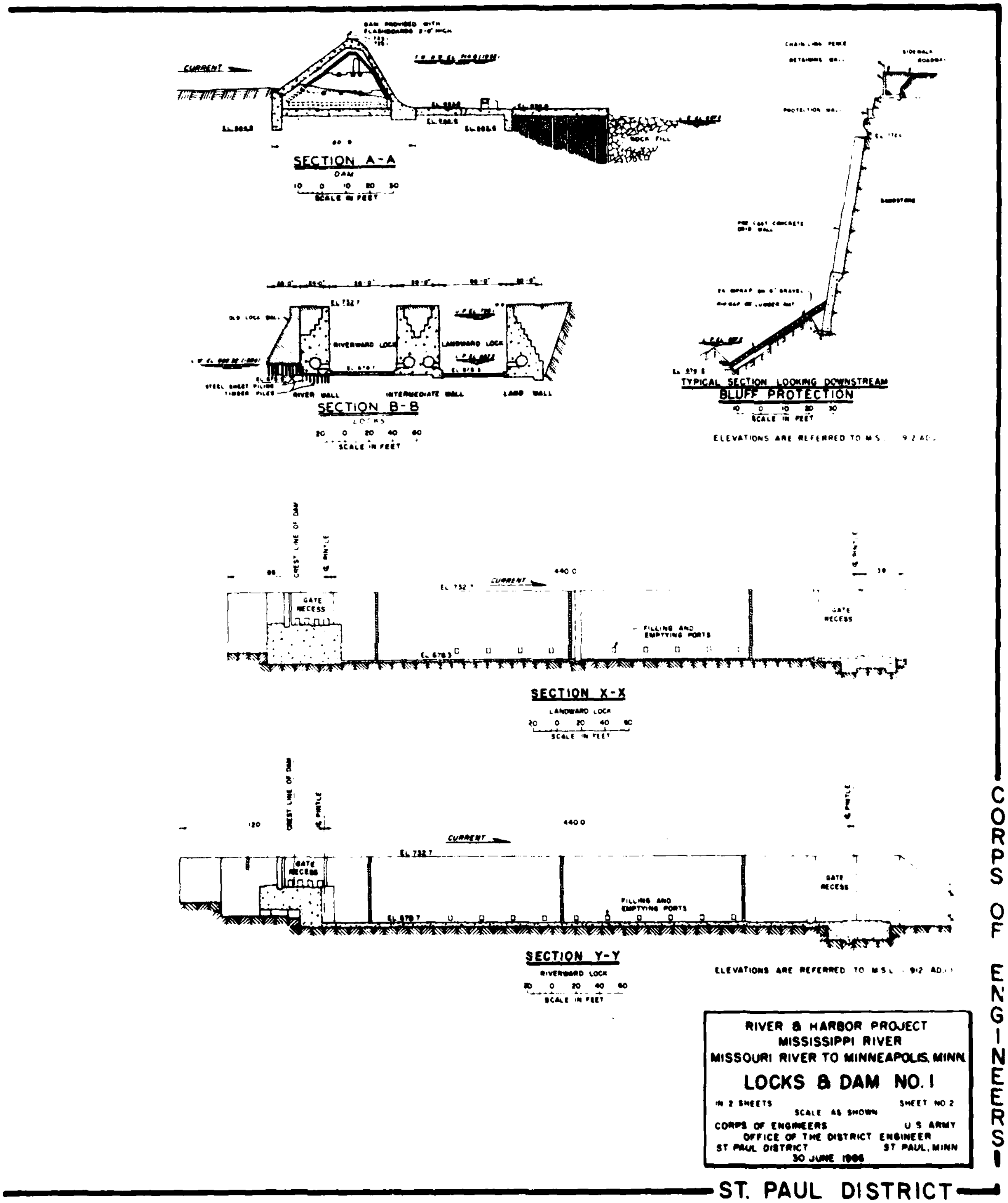
CURRENT
SECTION A-A
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SCALE IN FEET
ROCK FILL
SECTION B-B
LOCKS
SCALE IN FEET
EL 732.7
RIVERWARD LOCK
LANDWARD LOCK
RIVER WALL
INTERMEDIATE WALL
LAND WALL
TYPICAL SECTION LOOKING DOWNSTREAM
BLUFF PROTECTION
SCALE IN FEET
SANDSTONE
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CURRENT
GATE RECESS
FILLING AND EMPTYING PORTS
SECTION X-X
LANDWARD LOCK
SCALE IN FEET
CREST LINE OF DAM
440.0
CURRENT
EL 732.7
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FILLING AND EMPTYING PORTS
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30 JUNE 1966
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ST. PAUL DISTRICT

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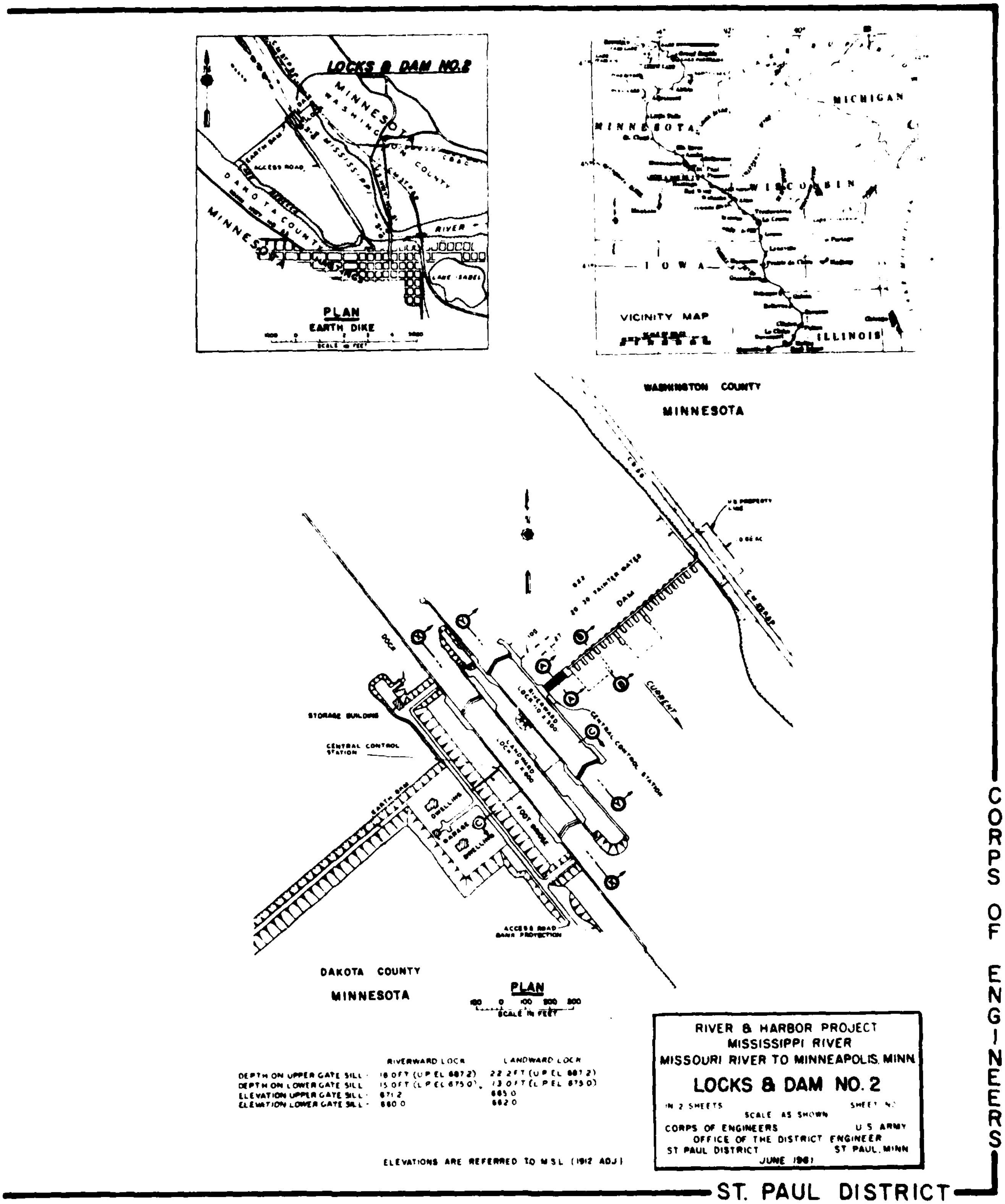
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EARTH DIKE
SCALE IN FEET
MINNESOTA
WASHINGTON
DAKOTA COUNTY
RIVER
MISSISSIPPI
MICHIGAN
MINNESOTA
WISCONSIN
IOWA
ILLINOIS
VICINITY MAP
WASHINGTON COUNTY
MINNESOTA
DAM
CURRENT
STORAGE BUILDING
CENTRAL CONTROL STATION
EARTH DAM
DWELLING
GARAGE
FOOT BRIDGE
ACCESS ROAD BANK PROTECTION
DAKOTA COUNTY
MINNESOTA
PLAN
100 0 100 200 300
SCALE IN FEET
RIVERWARD LOCK
LANDWARD LOCK
DEPTH ON UPPER GATE SILL - 16.0 FT (UP EL 687.2) 22.2 FT (UP EL 687.2)
DEPTH ON LOWER GATE SILL 15.0 FT (LP EL 675.0) 13.0 FT (LP EL 675.0)
ELEVATION UPPER GATE SILL - 671.2 665.0
ELEVATION LOWER GATE SILL - 660.0 662.0
ELEVATIONS ARE REFERRED TO MSL (1912 ADJ)
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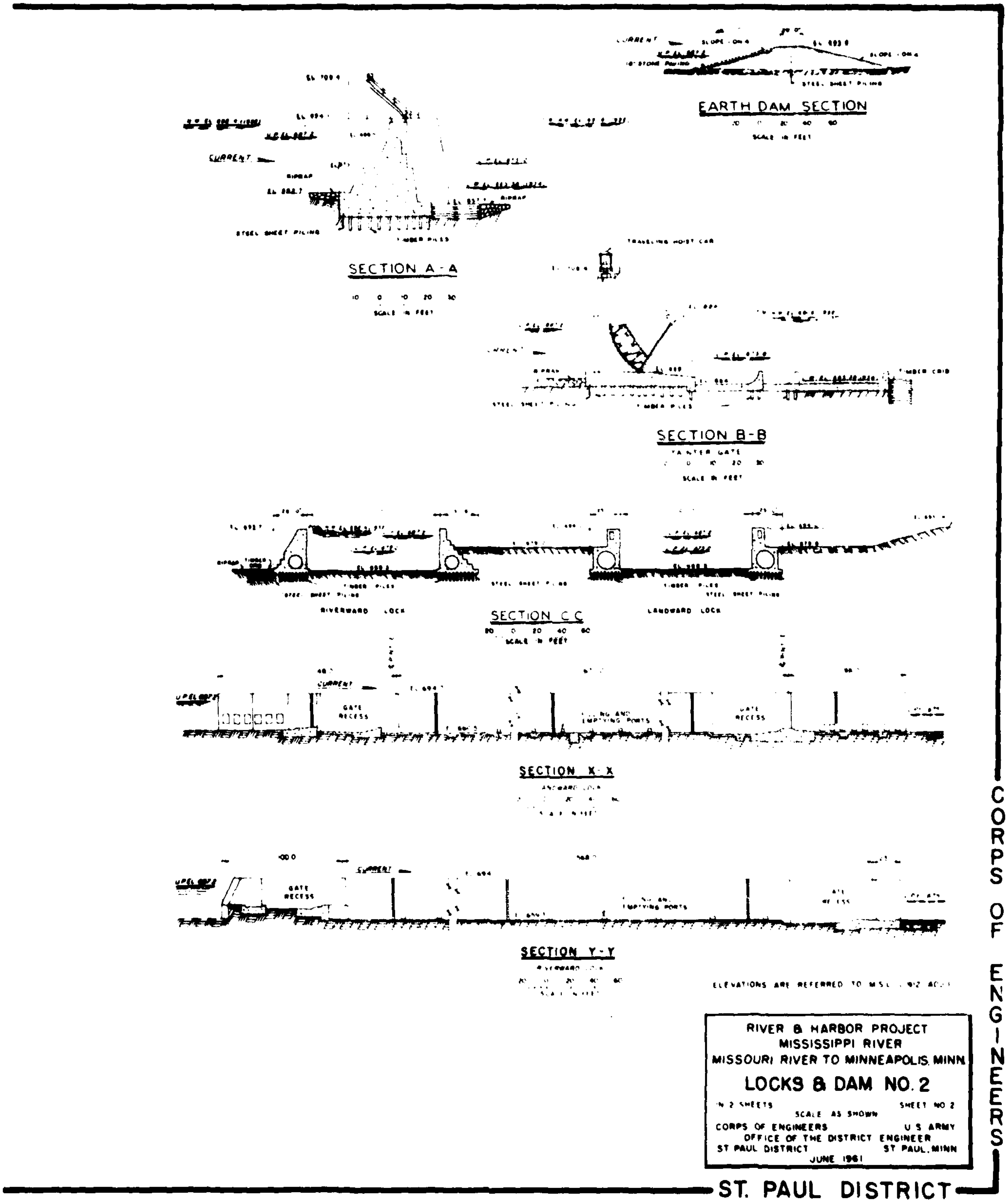
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SCALE IN FEET
STEEL SHEET PILING
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RIPRAP
STEEL SHEET PILING
TIMBER PILES
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TIMBER CRIB
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STEEL SHEET PILING
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ST PAUL, MINN
JUNE 1961
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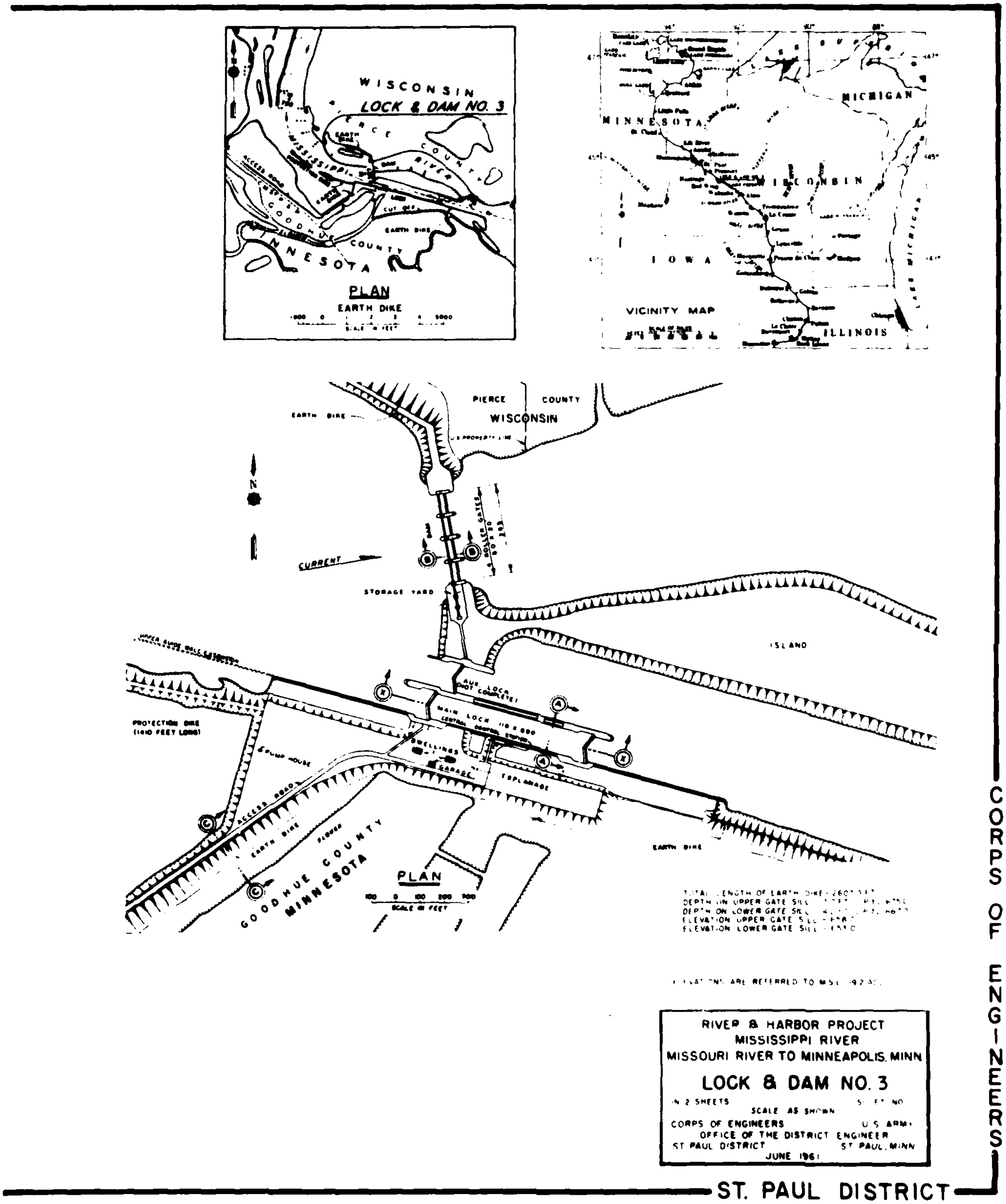
WISCONSIN
LOCK & DAM NO. 3
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MISSISSIPPI RIVER
GOODHUE COUNTY
MINNESOTA
PLAN
EARTH DIKE
VICINITY MAP
MINNESOTA
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MICHIGAN
IOWA
ILLINOIS
PIERCE COUNTY
WISCONSIN
EARTH DIKE
N
CURRENT
STORAGE YARD
ISLAND
PROTECTION DIKE (1410 FEET LONG)
PUMP HOUSE
ACCESS ROAD
EARTH DIKE
GOODHUE COUNTY
MINNESOTA
DWELLINGS
GARAGE
ESPLANADE
MAIN LOCK
AUX. LOCK (NOT COMPLETE)
EARTH DIKE
PLAN
SCALE IN FEET
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MISSOURI RIVER TO MINNEAPOLIS, MINN.
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ST. PAUL, MINN.
JUNE 1961
CORPS OF ENGINEERS
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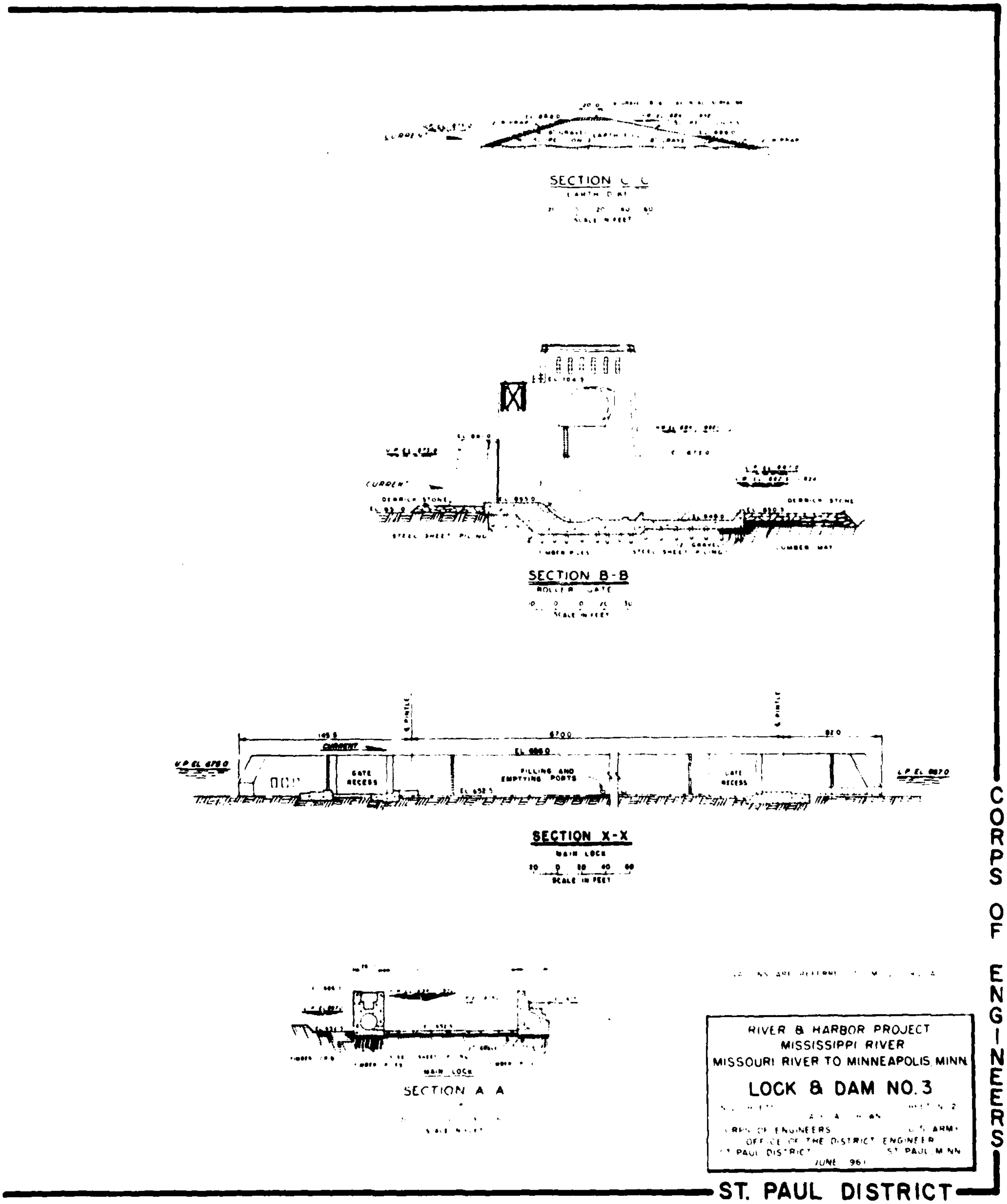
SECTION C-C
SECTION B-B
CURRENT
DERRICK STONE
STEEL SHEET PILING
TIMBER MAT
SECTION X-X
MAIN LOCK
SCALE IN FEET
CURRENT
GATE RECESS
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LOCK & DAM NO. 3
CORPS OF ENGINEERS
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ST. PAUL DISTRICT
ST. PAUL DISTRICT

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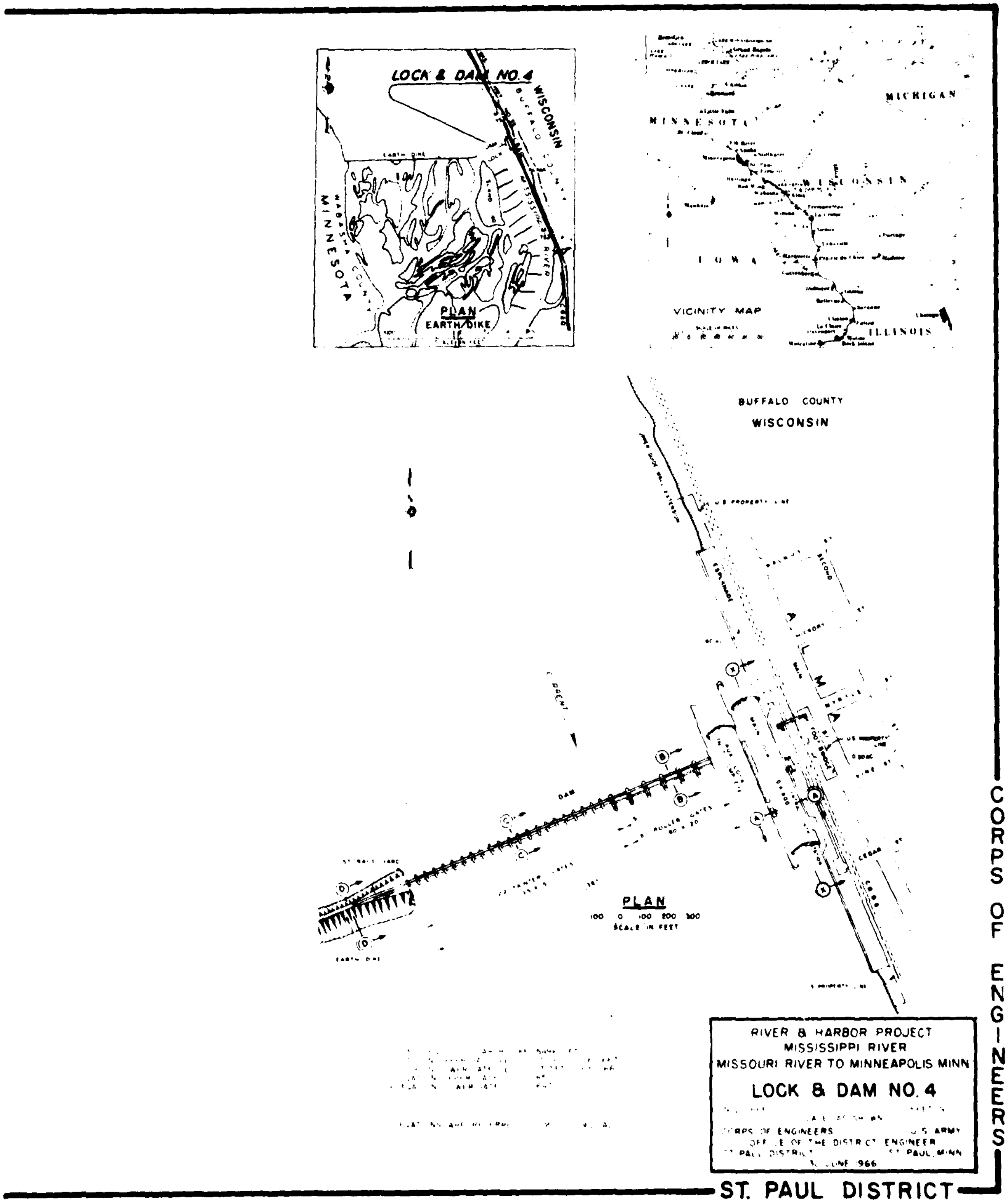
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WISCONSIN
BUFFALO COUNTY
MISSISSIPPI RIVER
WABASHA COUNTY
MINNESOTA
EARTH DIKE
PLAN
MICHIGAN
MINNESOTA
WISCONSIN
IOWA
ILLINOIS
VICINITY MAP
BUFFALO COUNTY
WISCONSIN
ALMA
DAM
PLAN
100 0 100 200 300
SCALE IN FEET
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MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS MINN
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JUNE 1966
CORPS OF ENGINEERS
ST. PAUL DISTRICT

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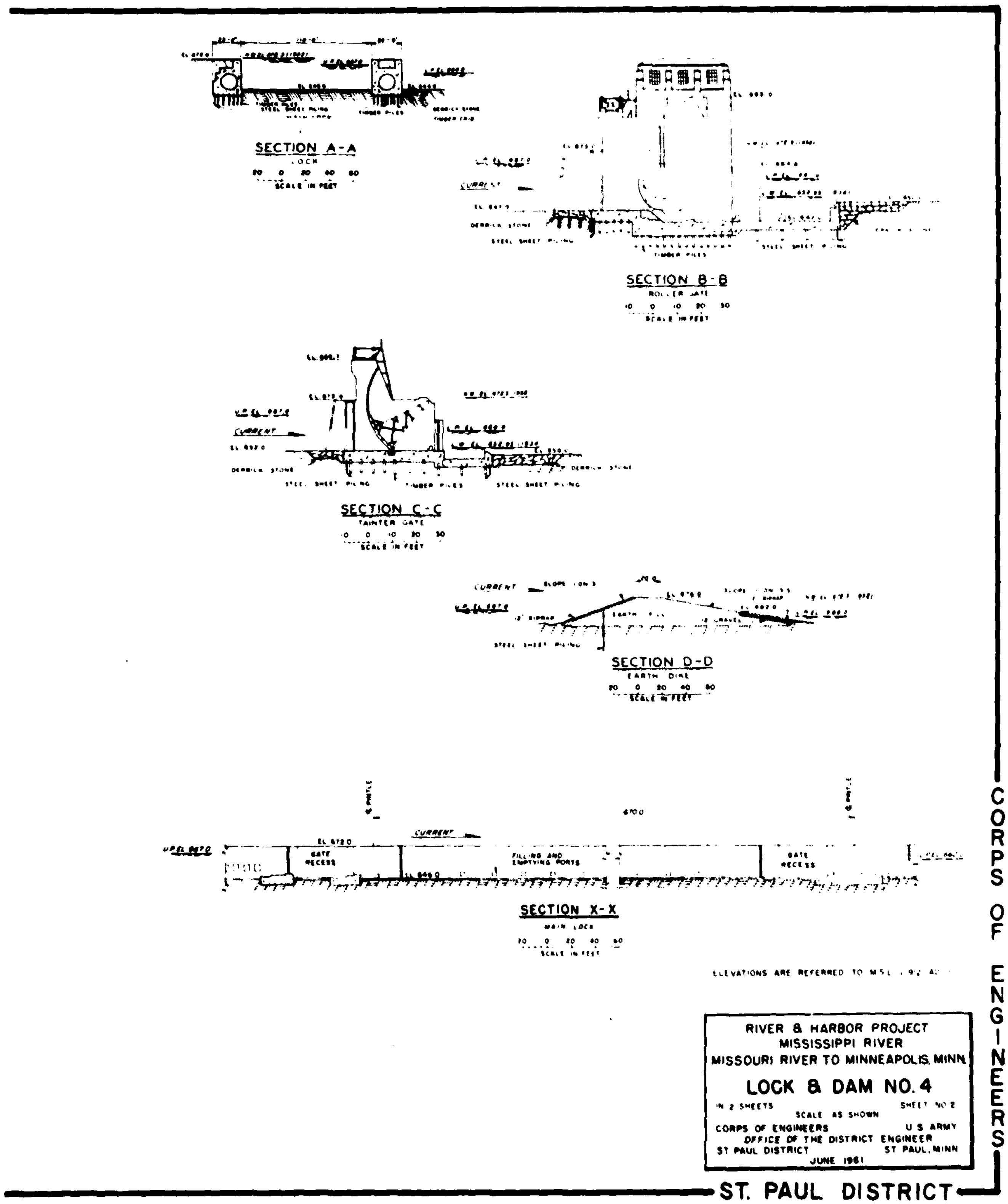
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10 0 10 20 30
SCALE IN FEET
SECTION C-C
TAINTER GATE
10 0 10 20 30
SCALE IN FEET
SECTION D-D
EARTH DIKE
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SCALE IN FEET
CURRENT
GATE RECESS
FILLING AND EMPTYING PORTS
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SCALE IN FEET
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IN 2 SHEETS
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JUNE 1961
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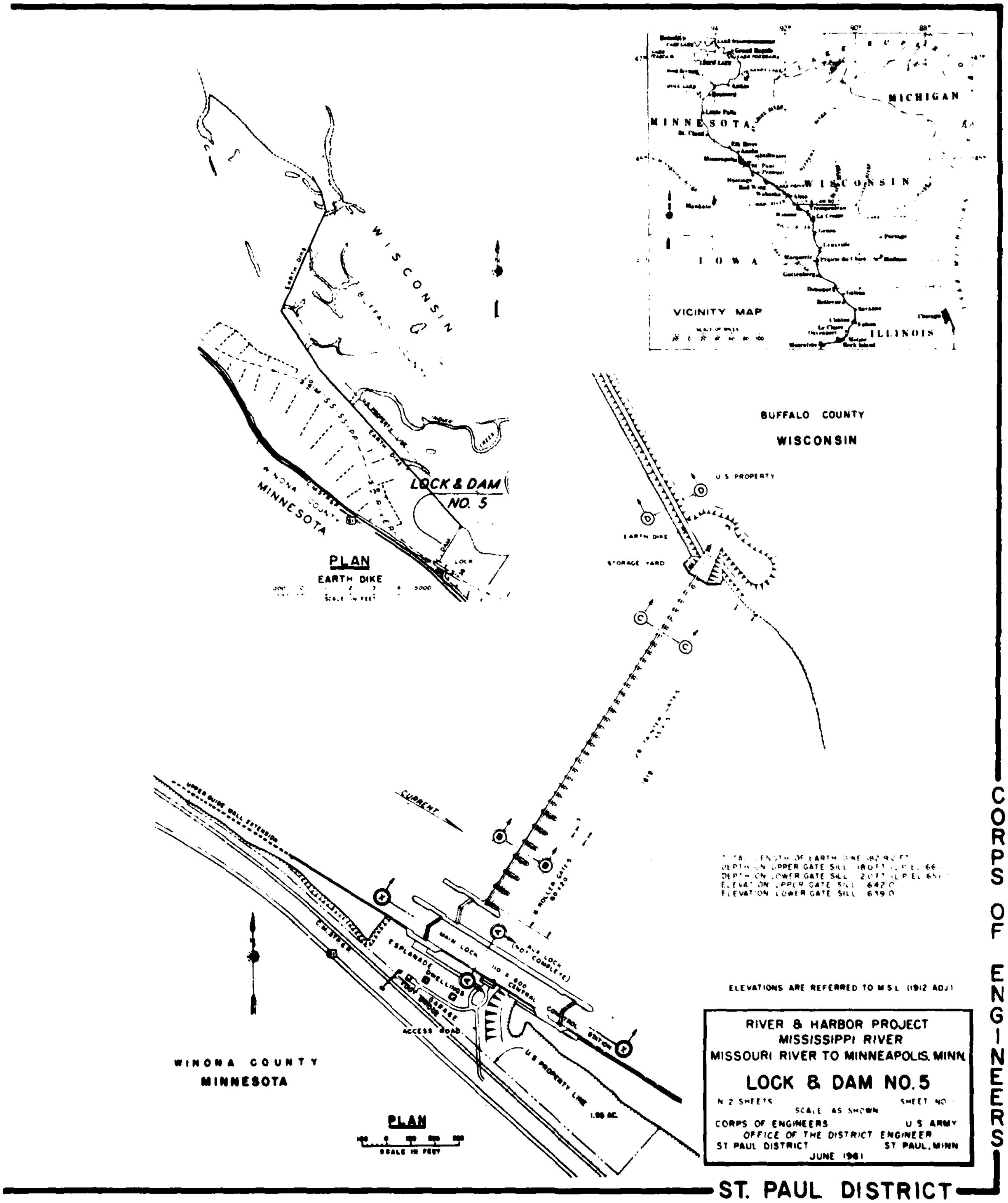
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IOWA
MICHIGAN
ILLINOIS
WISCONSIN
LOCK & DAM NO. 5
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EARTH DIKE
BUFFALO COUNTY
WISCONSIN
U.S. PROPERTY
EARTH DIKE
STORAGE YARD
CURRENT
ELEVATION UPPER GATE SILL 642.0
ELEVATION LOWER GATE SILL 639.0
ESPLANADE
DWELLINGS
GARAGE
ACCESS ROAD
MAIN LOCK
CENTRAL CONTROL STATION
U.S. PROPERTY LINE
WINONA COUNTY
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SCALE IN FEET
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U.S. ARMY
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ST. PAUL DISTRICT
ST. PAUL, MINN.
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

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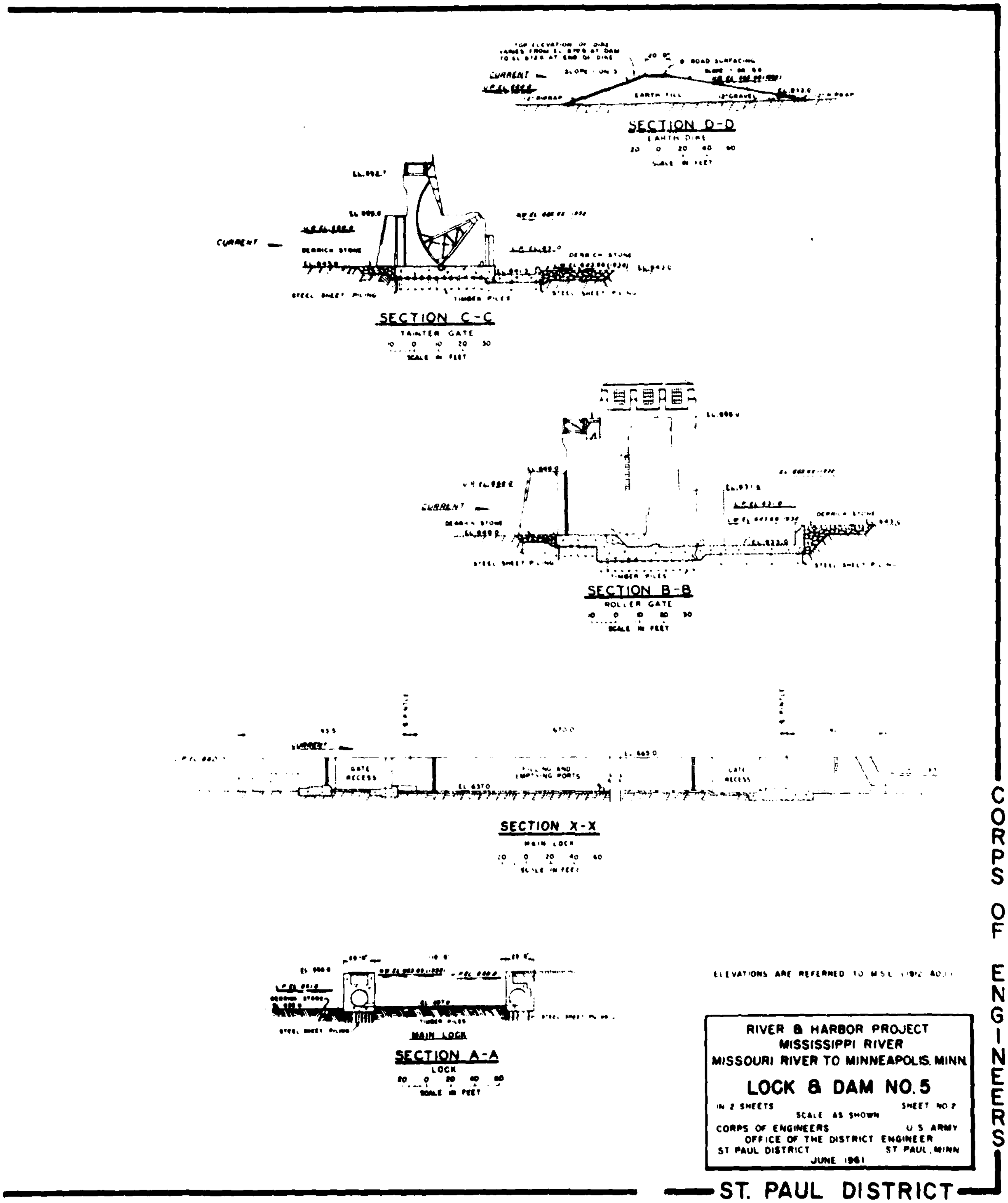
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EARTH DIKE
SCALE IN FEET
CURRENT
EARTH FILL
SECTION C-C
TAINTER GATE
SCALE IN FEET
STEEL SHEET PILING
TIMBER PILES
DERRICK STONE
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SCALE IN FEET
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SCALE IN FEET
MAIN LOCK
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MISSISSIPPI RIVER
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CORPS OF ENGINEERS
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ST. PAUL, MINN.
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

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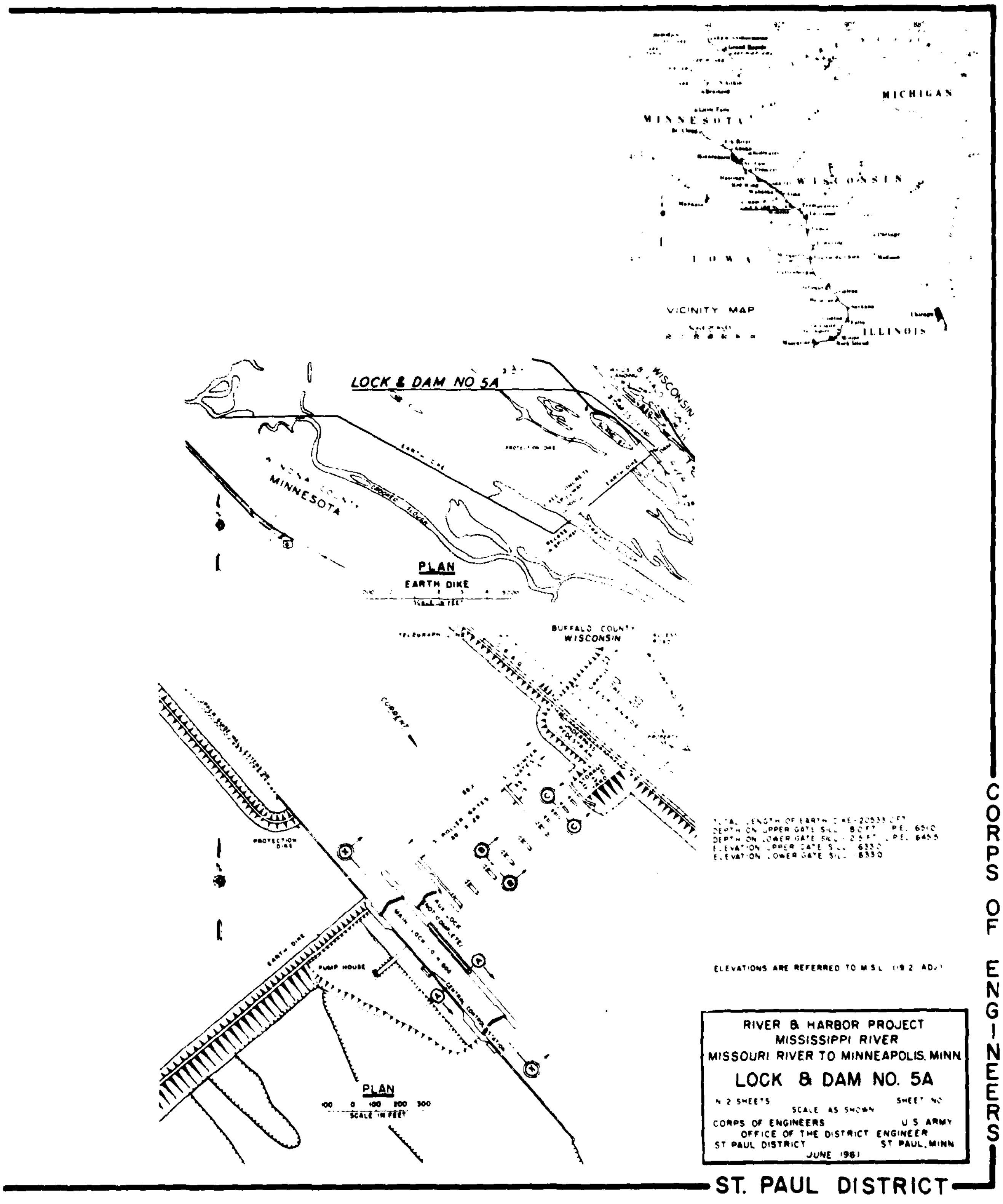
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MINNESOTA
WISCONSIN
IOWA
ILLINOIS
VICINITY MAP
LOCK & DAM NO 5A
WISCONSIN
MINNESOTA
PLAN
EARTH DIKE
BUFFALO COUNTY
WISCONSIN
CURRENT
PROTECTION DIKE
EARTH DIKE
PUMP HOUSE
PLAN
100 0 100 200 300
SCALE IN FEET
ELEVATIONS ARE REFERRED TO M.S.L. (1912 ADJ)
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN
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CORPS OF ENGINEERS
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ST PAUL, MINN
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

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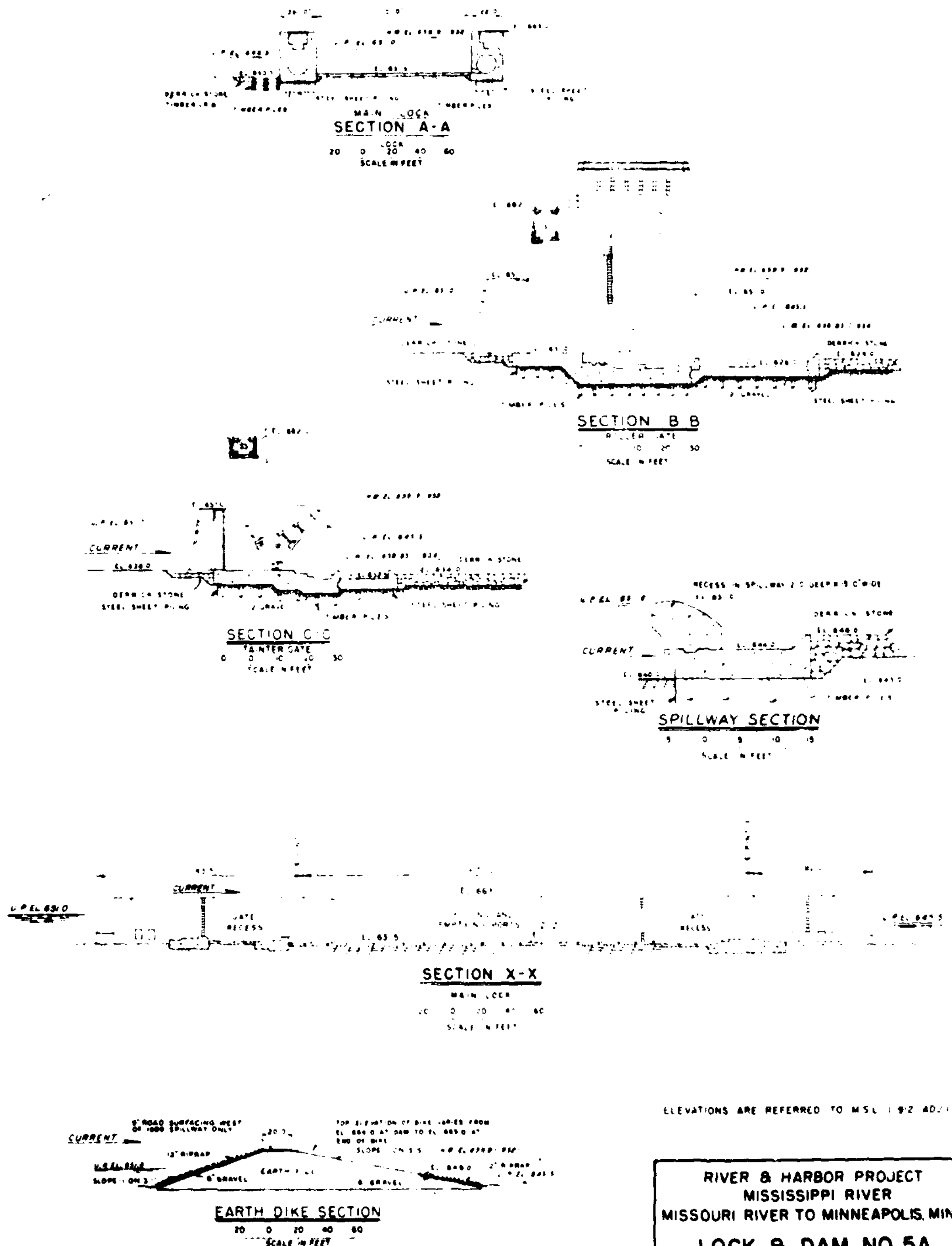

ELEVATIONS ARE REFERRED TO M.S.L. 1912 ADJ.

RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN.

LOCK & DAM NO. 5A

IN 2 SHEETS SHEET NO.
SCALE AS SHOWN
CORPS OF ENGINEERS U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
ST. PAUL DISTRICT ST. PAUL, MINN.
JUNE 1961

CORPS OF ENGINEERS

ST. PAUL DISTRICT

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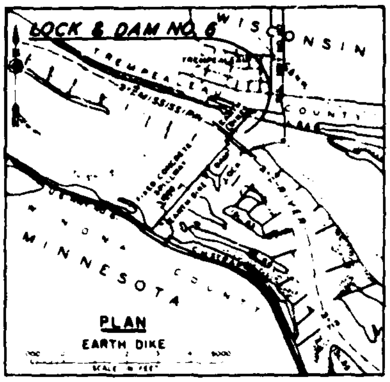
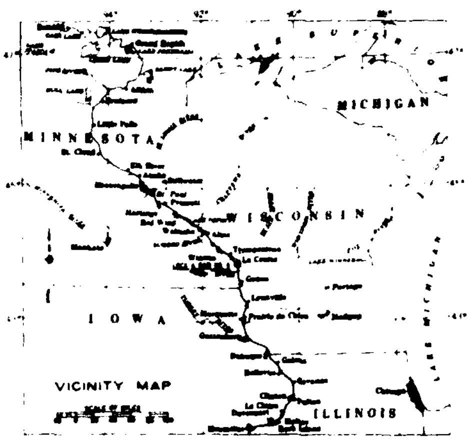
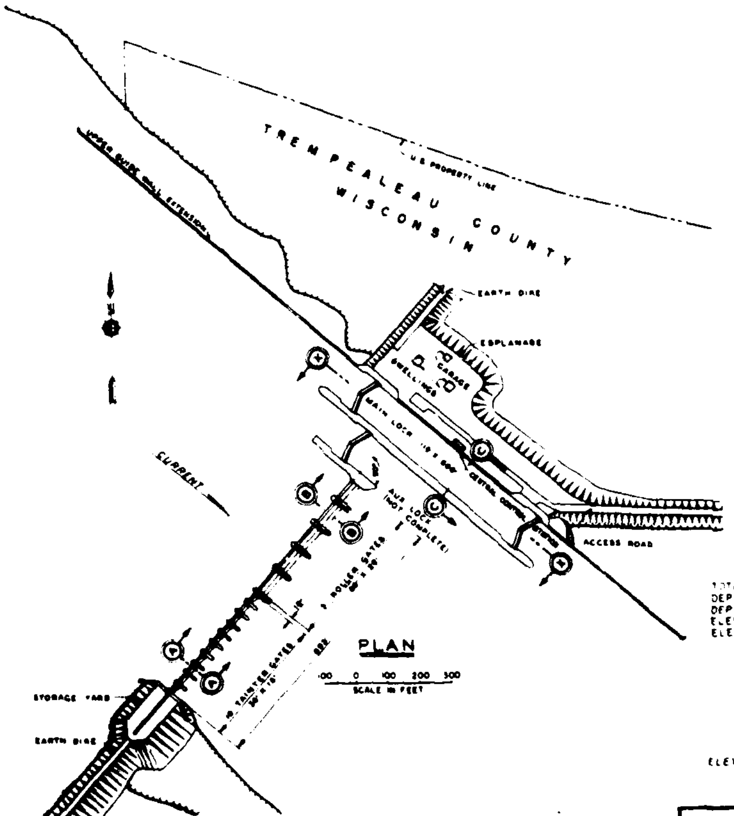






TOTAL LENGTH OF EARTH DIKE 3050.0 FT
DEPTH ON UPPER GATE SILL 17.0 FT (U.P.EL. 645.5)
DEPTH ON LOWER GATE SILL 12.5 FT (L.P.EL. 639.0)
ELEVATION UPPER GATE SILL - 628.5
ELEVATION LOWER GATE SILL - 626.5

ELEVATIONS ARE REFERRED TO M.S.L. (1912 ADJ.)

RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN.

LOCK & DAM NO. 6

IN 2 SHEETS — SHEET NO. 1
SCALE AS SHOWN
CORPS OF ENGINEERS — U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
ST. PAUL DISTRICT — ST. PAUL, MINN.
JUNE 1961

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 17

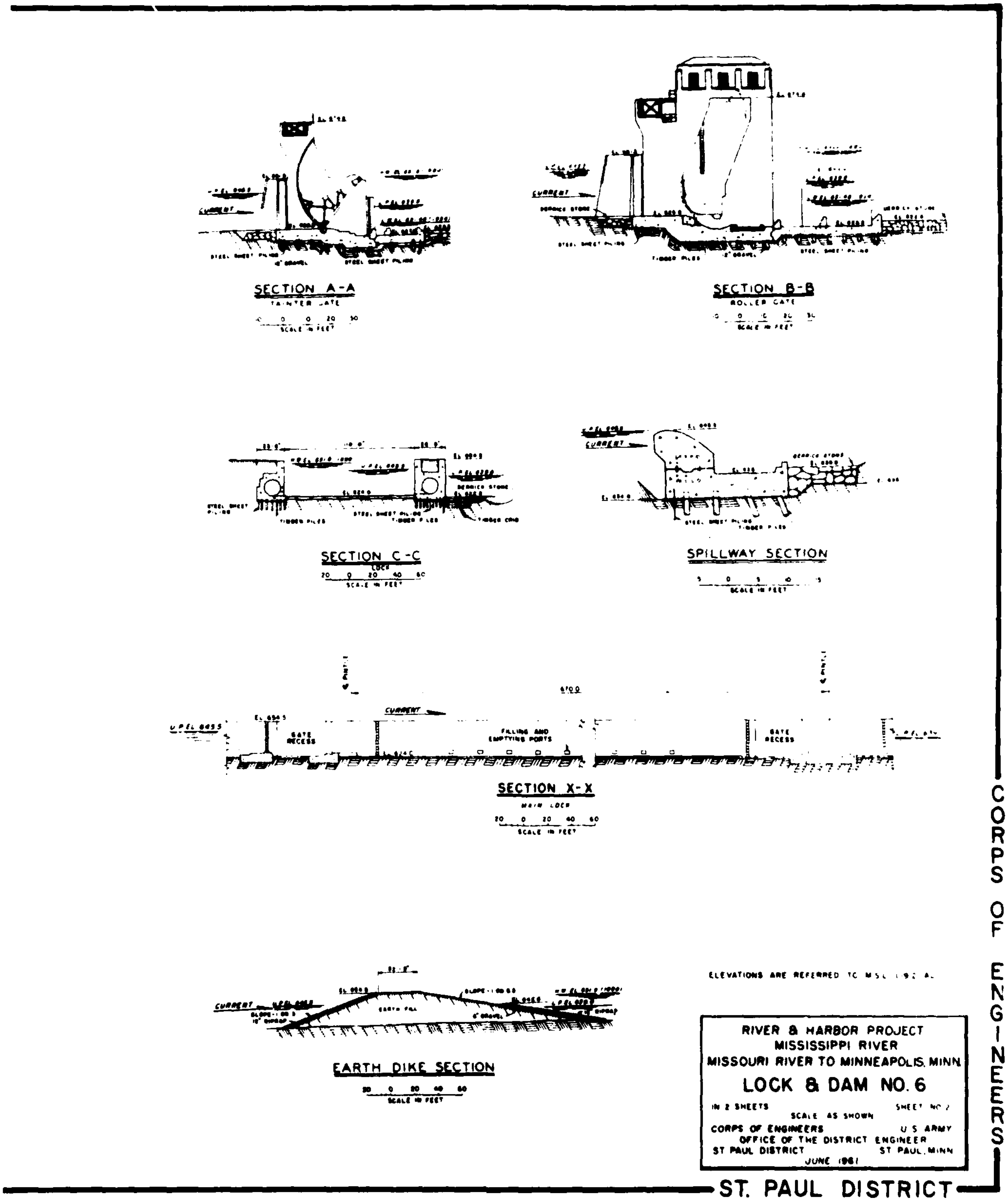
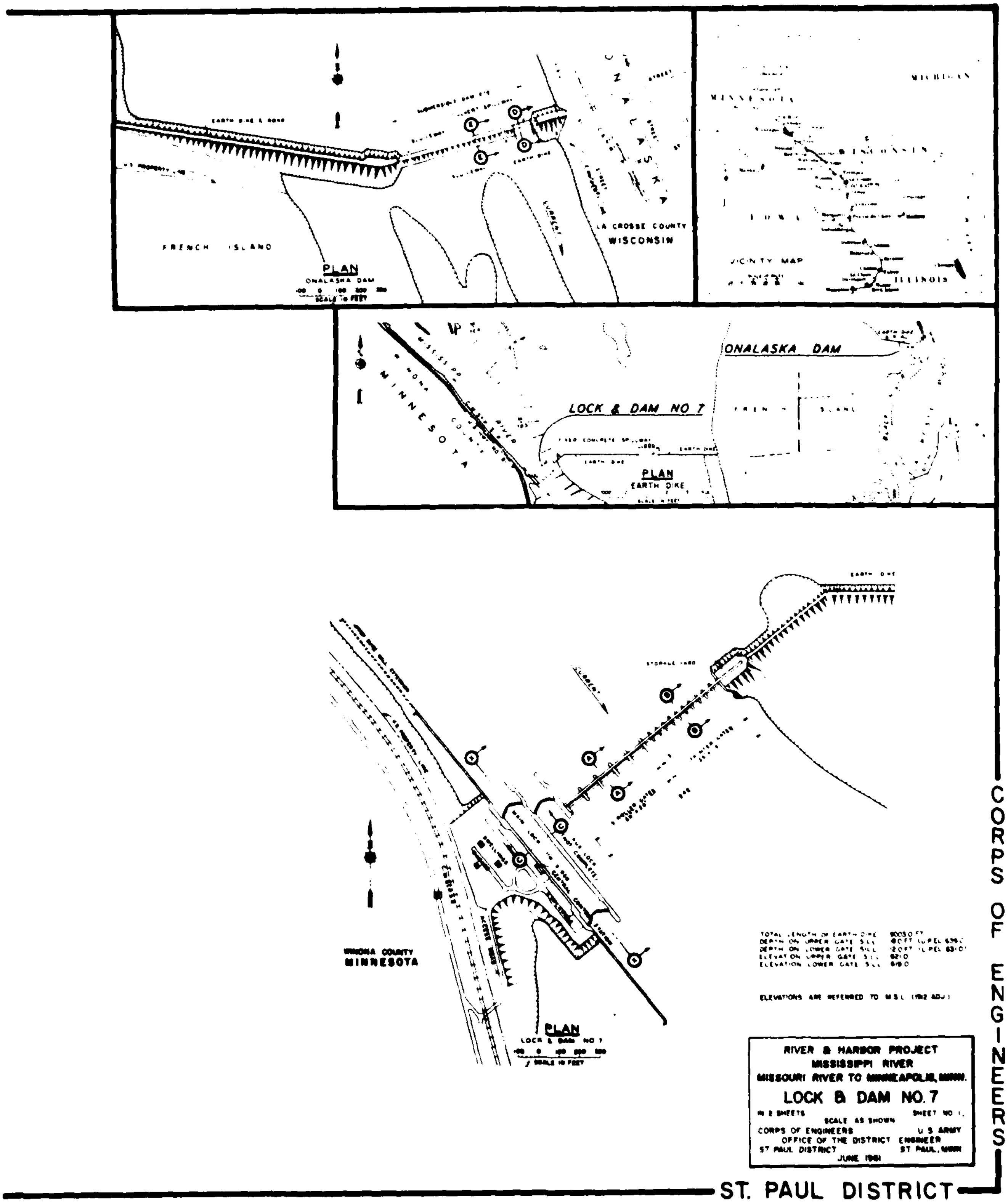

SECTION A-A
TAINTER GATE
SCALE IN FEET
SECTION B-B
ROLLER GATE
SCALE IN FEET
SECTION C-C
LOCK
SCALE IN FEET
SPILLWAY SECTION
SCALE IN FEET
CURRENT
GATE RECESS
FILLING AND EMPTYING PORTS
SECTION X-X
MAIN LOCK
SCALE IN FEET
EARTH DIKE SECTION
SCALE IN FEET
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN.
LOCK & DAM NO. 6
IN 2 SHEETS
SCALE AS SHOWN
CORPS OF ENGINEERS
U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
ST. PAUL DISTRICT
ST. PAUL, MINN.
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 18



FRENCH ISLAND
PLAN
ONALASKA DAM
LA CROSSE COUNTY
WISCONSIN
MICHIGAN
MINNESOTA
WISCONSIN
IOWA
ILLINOIS
VICINITY MAP
ONALASKA DAM
LOCK & DAM NO 7
MINNESOTA
PLAN
EARTH DIKE
WINONA COUNTY
MINNESOTA
PLAN
LOCK & DAM NO 7
ELEVATIONS ARE REFERRED TO M.S.L.
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN.
LOCK & DAM NO. 7
IN 2 SHEETS
SHEET NO. 1
SCALE AS SHOWN
CORPS OF ENGINEERS
U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
ST PAUL DISTRICT
ST PAUL, MINN
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 19

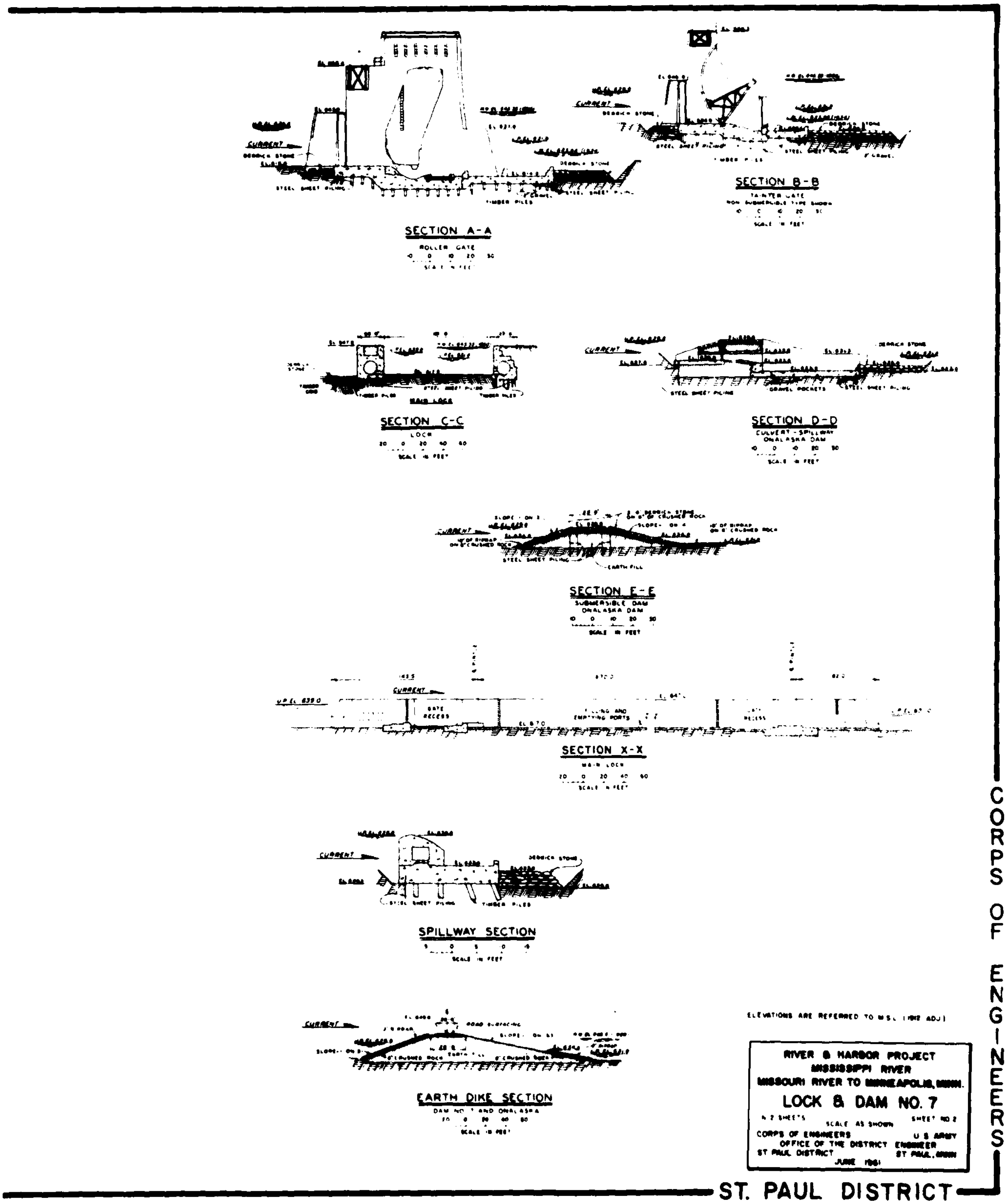

SECTION A-A
ROLLER GATE
SCALE IN FEET
SECTION B-B
TAINTER GATE
SCALE IN FEET
SECTION C-C
LOCK
SCALE IN FEET
SECTION D-D
CULVERT - SPILLWAY
ONALASKA DAM
SCALE IN FEET
SECTION E-E
SUBMERSIBLE DAM
ONALASKA DAM
SCALE IN FEET
SECTION X-X
MAIN LOCK
SCALE IN FEET
SPILLWAY SECTION
SCALE IN FEET
EARTH DIKE SECTION
SCALE IN FEET
CURRENT
STEEL SHEET PILING
TIMBER PILES
DERRICK STONE
GATE RECESS
FILLING AND EMPTYING PORTS
EARTH FILL
ELEVATIONS ARE REFERRED TO M.S.L. (1912 ADJ.)
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN.
LOCK & DAM NO. 7
SCALE AS SHOWN
SHEET NO. 2
CORPS OF ENGINEERS
U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
ST. PAUL DISTRICT
ST. PAUL, MINN.
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 20

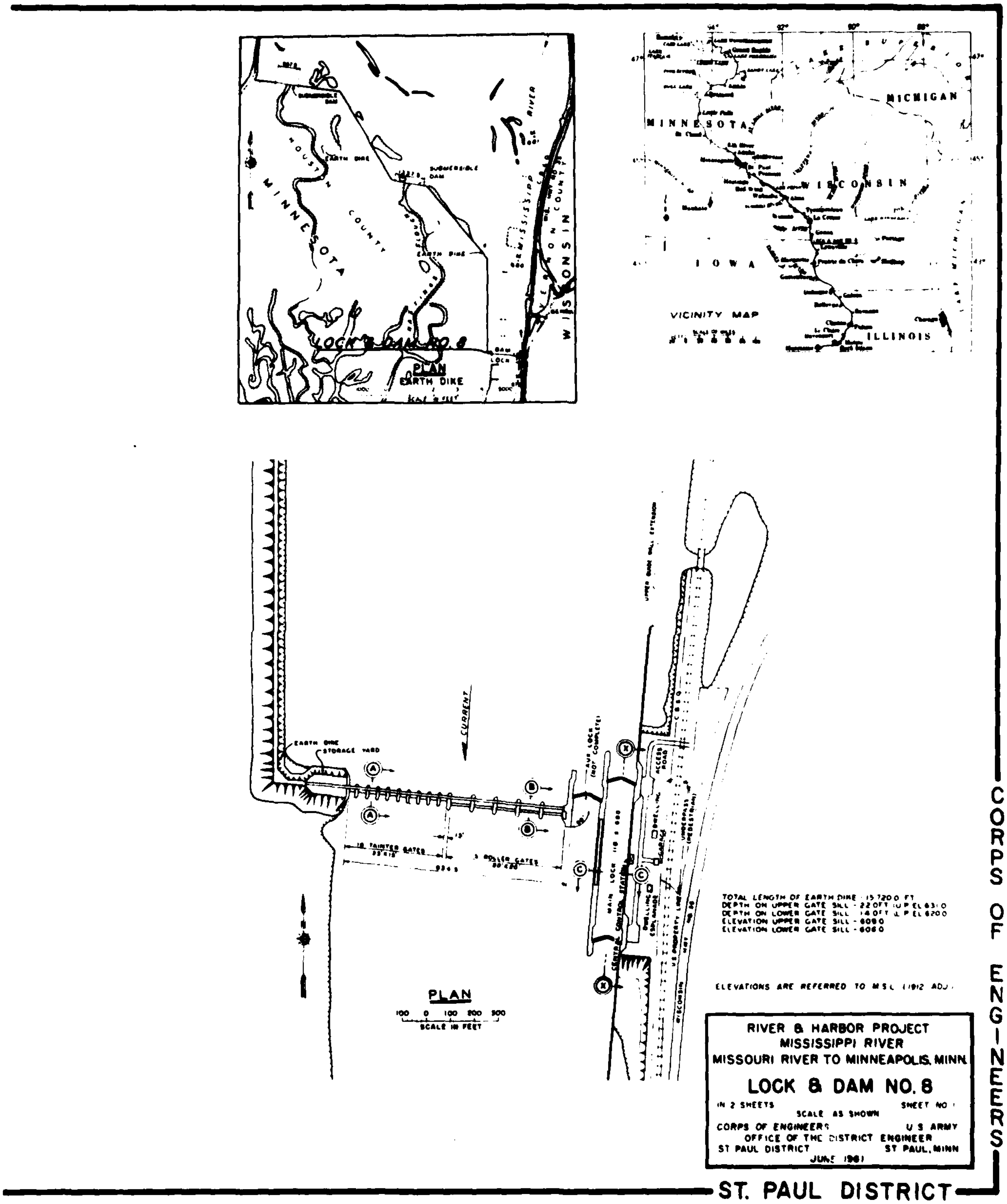
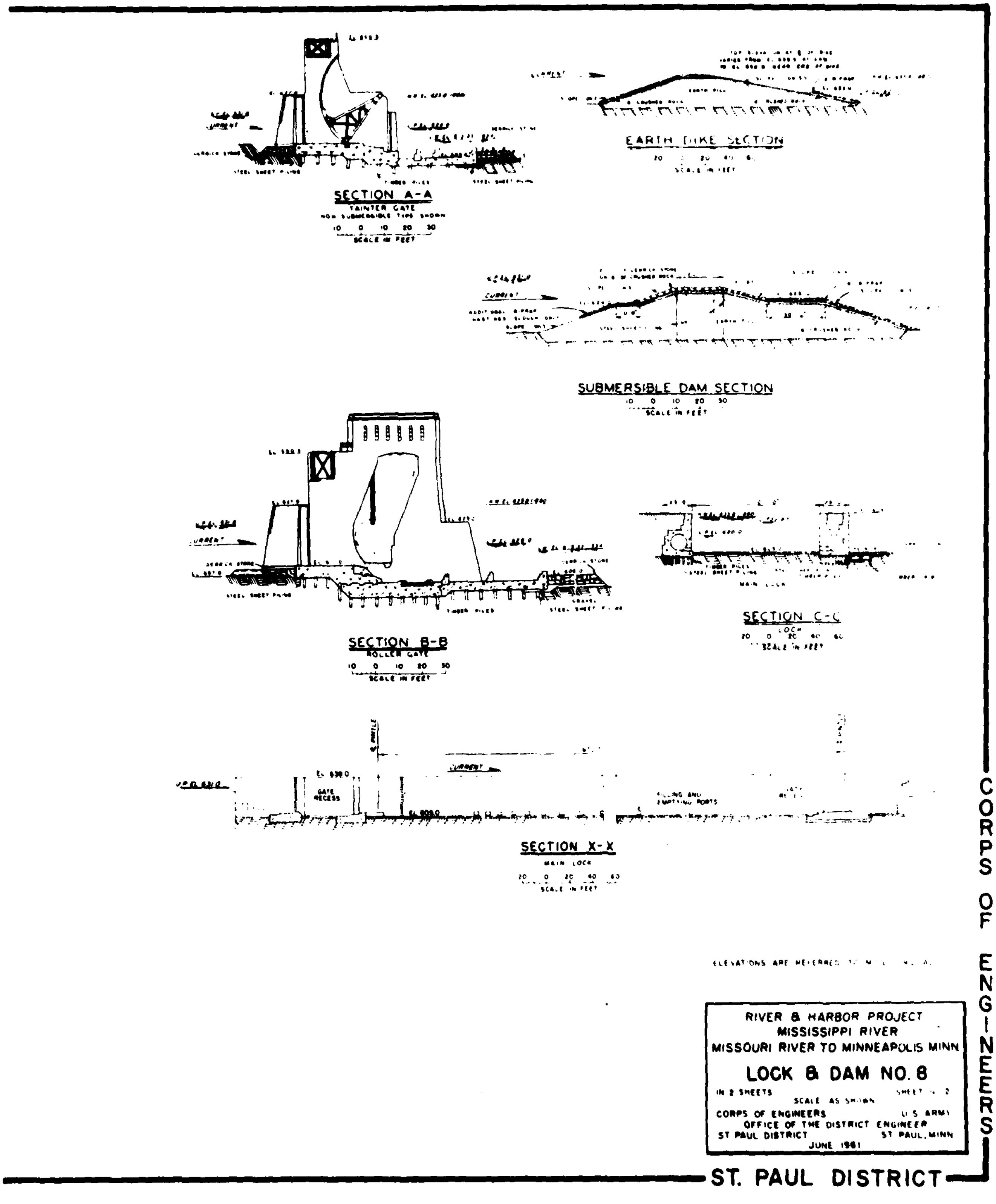
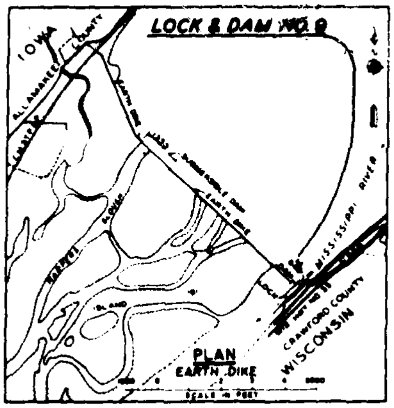

PLAN
EARTH DIKE
MINNESOTA
WISCONSIN
MISSISSIPPI RIVER
LOCK & DAM NO. 8
SUBMERSIBLE DAM
EARTH DIKE
LOCK
DAM
MICHIGAN
MINNESOTA
WISCONSIN
IOWA
ILLINOIS
VICINITY MAP
EARTH DIKE
STORAGE YARD
CURRENT
15 TAINTER GATES
5 ROLLER GATES
AUX. LOCK (NOT COMPLETE)
MAIN LOCK 110 x 600
ACCESS ROAD
PLAN
100 0 100 200 300
SCALE IN FEET
TOTAL LENGTH OF EARTH DIKE - 15,720.0 FT
DEPTH ON UPPER GATE SILL - 22.0 FT (U.P. EL 631.0
DEPTH ON LOWER GATE SILL - 14.0 FT (L.P. EL 620.0
ELEVATION UPPER GATE SILL - 609.0
ELEVATION LOWER GATE SILL - 606.0
ELEVATIONS ARE REFERRED TO M.S.L. (1912 ADJ.)
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN.
LOCK & DAM NO. 8
IN 2 SHEETS
SHEET NO. 1
SCALE AS SHOWN
CORPS OF ENGINEERS
U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
ST. PAUL DISTRICT
ST. PAUL, MINN.
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

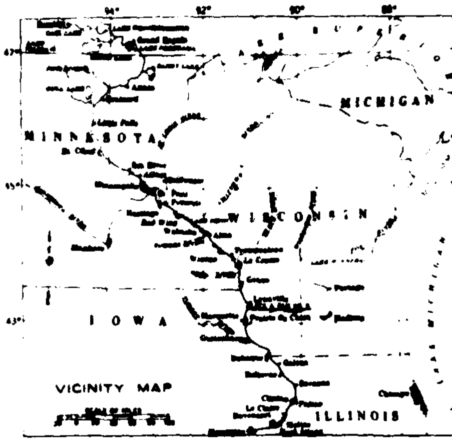
EXHIBIT 21

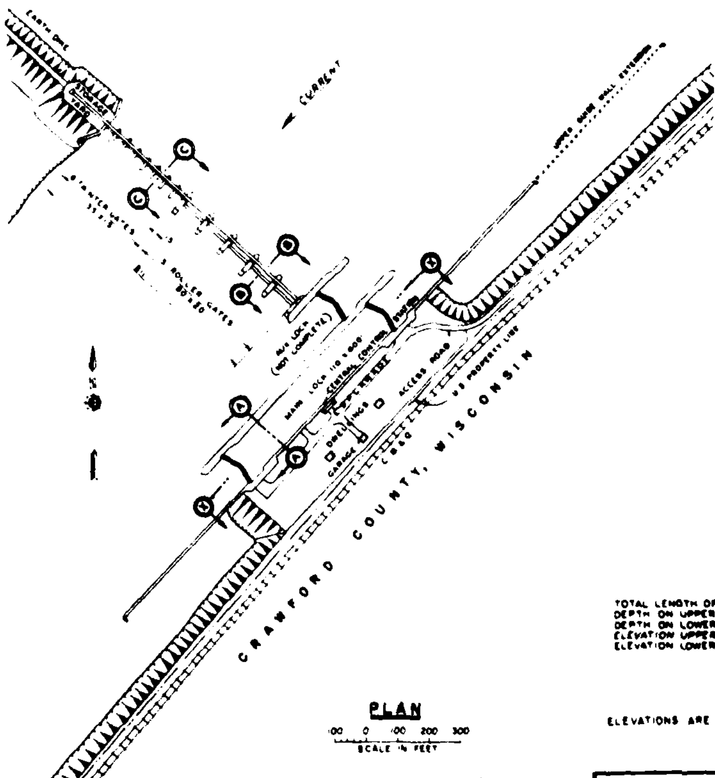


SECTION A-A
TAINTER GATE
SCALE IN FEET
EARTH DIKE SECTION
SCALE IN FEET
SUBMERSIBLE DAM SECTION
SCALE IN FEET
SECTION B-B
ROLLER GATE
SCALE IN FEET
SECTION C-C
LOCK
SCALE IN FEET
CURRENT
GATE RECESS
FILLING AND EMPTYING PORTS
SECTION X-X
MAIN LOCK
SCALE IN FEET
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS MINN
LOCK & DAM NO. 8
IN 2 SHEETS
SCALE AS SHOWN
CORPS OF ENGINEERS
U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
ST PAUL DISTRICT
ST PAUL, MINN
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 22







TOTAL LENGTH OF EARTH DIKE - 8004.0 FT
DEPTH ON UPPER GATE SILL - 16.0 FT (U.P. EL 620.0)
DEPTH ON LOWER GATE SILL - 13.0 FT (L.P. EL 611.0)
ELEVATION UPPER GATE SILL - 604.0
ELEVATION LOWER GATE SILL - 598.0

ELEVATIONS ARE REFERRED TO M.S.L. (1912 ADJ.)

RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN.

LOCK & DAM NO. 9

IN 2 SHEETS SHEET NO. 1
SCALE AS SHOWN
CORPS OF ENGINEERS U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
ST. PAUL DISTRICT ST. PAUL, MINN.
JUNE 1961

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 23

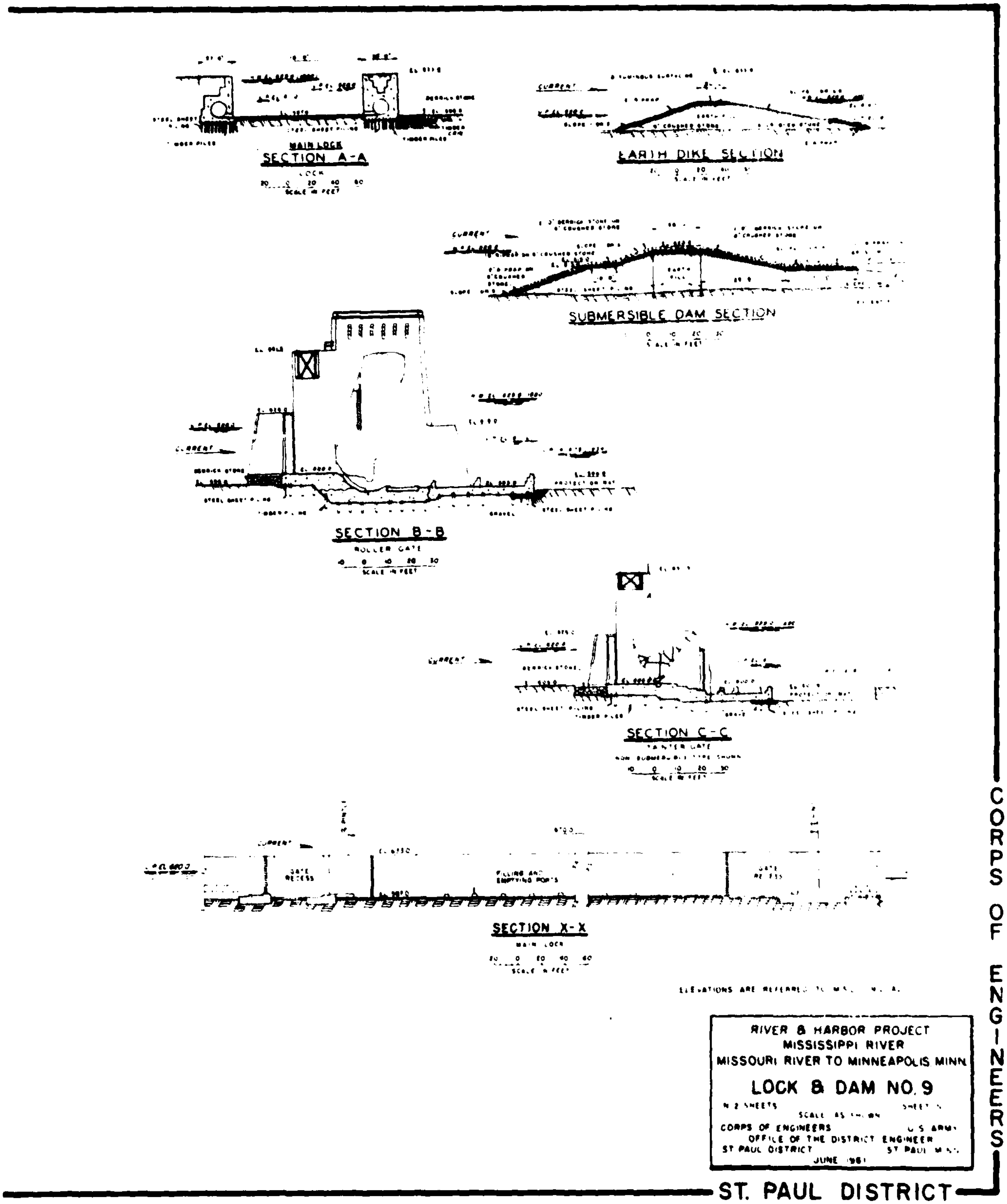
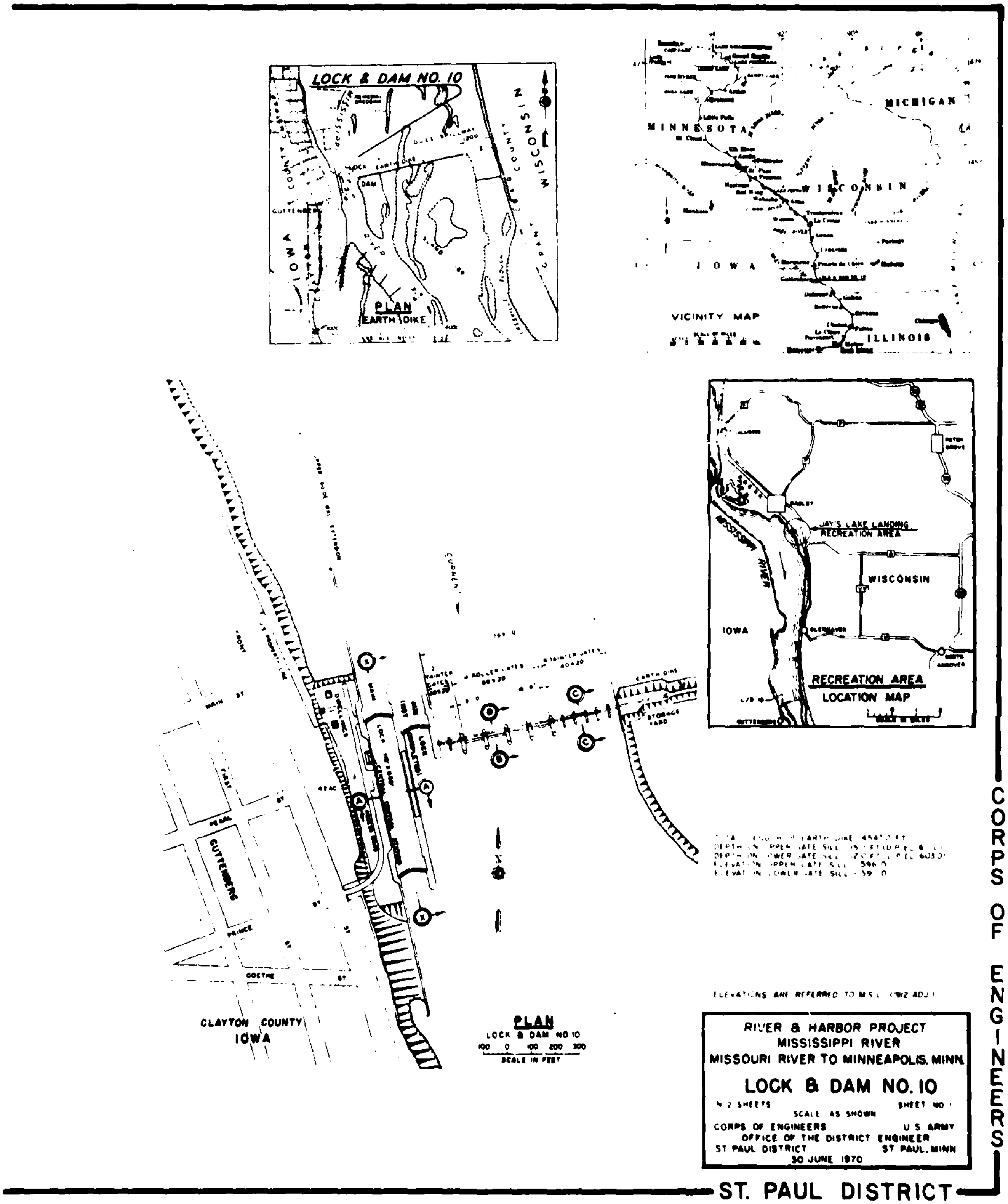

MAIN LOCK
SECTION A-A
EARTH DIKE SECTION
CURRENT
SUBMERSIBLE DAM SECTION
SECTION B-B
ROLLER GATE
SCALE IN FEET
SECTION C-C
TAINTER GATE
SECTION X-X
MAIN LOCK
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS MINN
LOCK & DAM NO. 9
CORPS OF ENGINEERS
OFFICE OF THE DISTRICT ENGINEER
ST PAUL DISTRICT
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 24



LOCK & DAM NO. 10
PLAN
EARTH DIKE
IOWA
WISCONSIN
VICINITY MAP
MINNESOTA
MICHIGAN
WISCONSIN
IOWA
ILLINOIS
JAY'S LAKE LANDING
RECREATION AREA
WISCONSIN
IOWA
RIVER
RECREATION AREA
LOCATION MAP
GUTTENBERG
EARTH DIKE
STORAGE YARD
CLAYTON COUNTY
IOWA
PLAN
LOCK & DAM NO 10
100 0 100 200 300
SCALE IN FEET
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN.
LOCK & DAM NO. 10
SCALE AS SHOWN
CORPS OF ENGINEERS U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
ST PAUL DISTRICT ST PAUL, MINN
30 JUNE 1970
CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 25

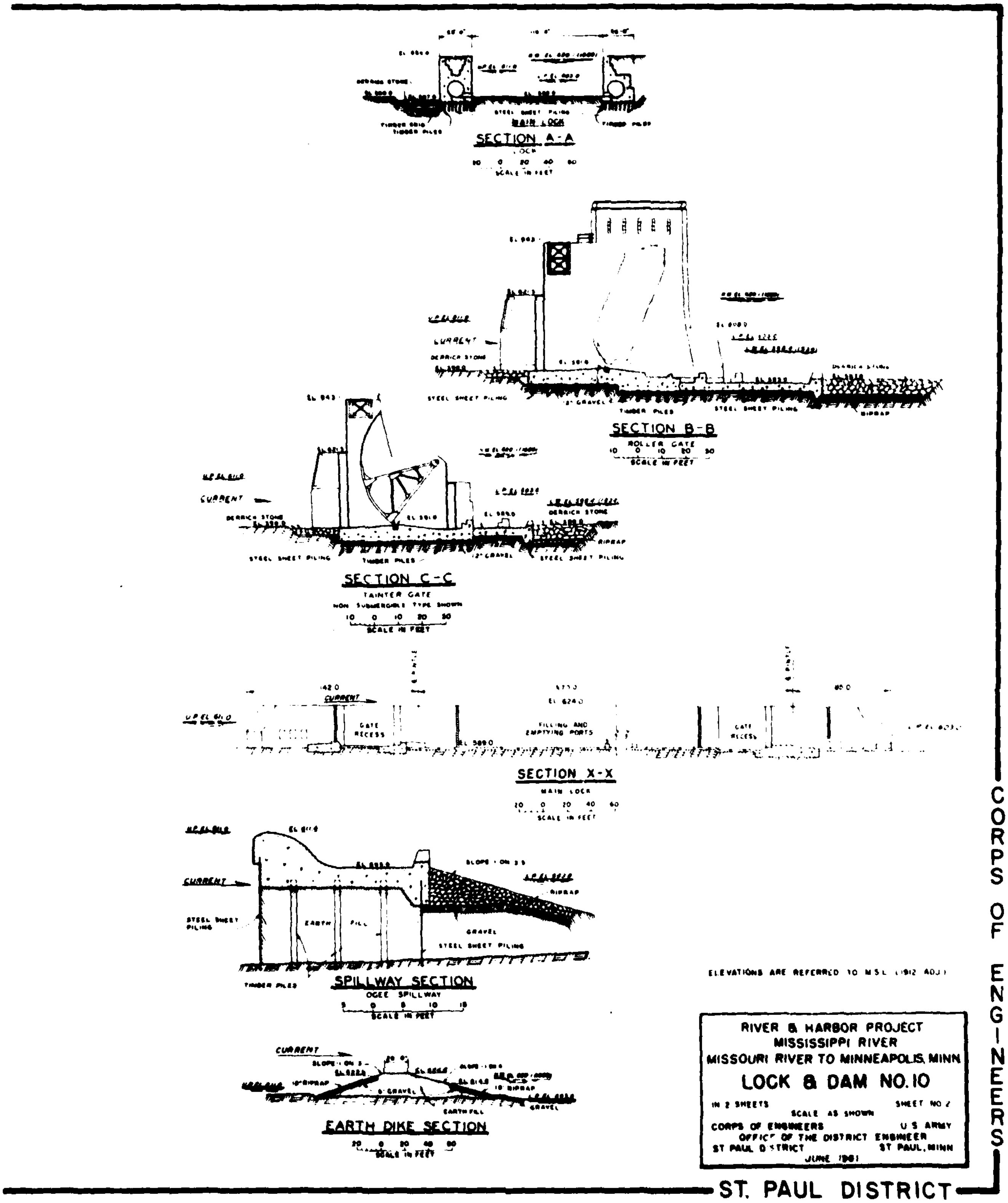

SECTION A-A
MAIN LOCK
SECTION B-B
ROLLER GATE
SCALE IN FEET
SECTION C-C
TAINTER GATE
SCALE IN FEET
SECTION X-X
MAIN LOCK
GATE RECESS
FILLING AND EMPTYING PORTS
SCALE IN FEET
SPILLWAY SECTION
OGEE SPILLWAY
SCALE IN FEET
EARTH DIKE SECTION
SCALE IN FEET
STEEL SHEET PILING
TIMBER PILES
GRAVEL
RIPRAP
EARTH FILL
CURRENT
DERRICK STONE
ELEVATIONS ARE REFERRED TO M.S.L. (1912 ADJ.)
RIVER & HARBOR PROJECT
MISSISSIPPI RIVER
MISSOURI RIVER TO MINNEAPOLIS, MINN.
LOCK & DAM NO. 10
IN 2 SHEETS
SHEET NO. 2
SCALE AS SHOWN
CORPS OF ENGINEERS
U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
ST. PAUL DISTRICT
ST. PAUL, MINN.
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 26

Summary of project characteristics

Mississippi River locks and dams-St. Paul District

Lock and dam	Miles above Ohio River	Location	Lock dimensions: Width of chamber (feet)	Lock dimensions: Greatest length available for full width (feet)	Lock dimensions: Lift (feet)	Upper normal pool elevation(1)	Depth on miter sill: upper (feet)	Depth on miter sill: lower (feet)	Number of roller gates	Number of tainter gates	Length of fixed crest spillway (feet)	Length of earth dike (feet)	Length of submersible dam (feet)	Year opened to navigation
St. Anthony Falls, upper lock	853.8	In city of Minneapolis, Minn.	56	400	49.2	799.2	15.7	13.7	-	1	440	-	-	1963
St. Anthony Falls, lower lock and dam	853.4	In city of Minneapolis, Minn.	56	400	26.9(2)	750.0	13.7	10.3(2)	-	5	-	-	-	1959
Lock and dam 1	847.6	Minneapolis-St. Paul	56 56	400 400	35.9(2) 35.9	725.1 -	13.5(2) 12.5(3)	10.1 7.6	-	-	574	-	-	1917
Lock and dam 2	815.2	1.3 above Hastings, Minn.	110 110	500(4) 600	12.2 12.2	- 687.2	16.0 22.2	15.1 13.0	-	20	100	3,000	-	1930 1948
Lock and dam 3	796.9	6.1 above Red Wing, Minn.	110	600	8.0	675.0	17.0	14.0	4	-	-	2,607	-	1938
Lock and dam 4	752.8	Alma, Wis.	110	600	7.0	667.0	17.0	13.0	6	22	-	5,496	-	1935
Lock and dam 5	738.1	Minneiska, Minn.	110	600	9.0	660.0	18.0	12.0	6	28	-	18,219	-	1935
Lock and dam 5A	728.5	3 above Winona, Minn.	110	600	5.5	651.0	18.0	12.5	5	5	1,000	20,533	-	1936
Lock and dam 6	714.3	Trempealeau, Wis.	110	600	6.5	645.5	17.0	12.5	5	10	1,000	3,050	-	1936
Lock and dam 7	702.5	Dresbach, Minn.	110	600	8.0	639.0	18.0	12.0	5	11	1,000	9,003	670	1937
Lock and dam 8	679.2	Genoa, Wis.	110	600	11.0	631.0	22.0	14.0	5	10	-	15,720	2,275(5)	1937
Lock and dam 9	647.9	3.3 below Lynxville, Wis.	110	600	9.0	620.0	16.0	13.0	5	8	-	8,004	1,350	1938
Lock and dam 10	615.1	Guttenberg, Iowa	110	600	8.0	611.0	15.0	12.0	4	6	1,200	4,547	-	1936

(1) Elevation of pools are mean sea level 1912 adjustment.
(2) Based on pool elevation 723.1 in pool 1 which is crest of dam. Pool is normally maintained at elevation 725.1 by flashboards.
(3) Old upper guard sill.
(4) Landward lock.
(5) In two sections of 937.5 feet and 1,337.5 feet.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

SUMMARY OF PROJECT CHARACTERISTICS MISSISSIPPI RIVER
LOCKS AND DAMS, ST. PAUL DISTRICT

EXHIBIT 27

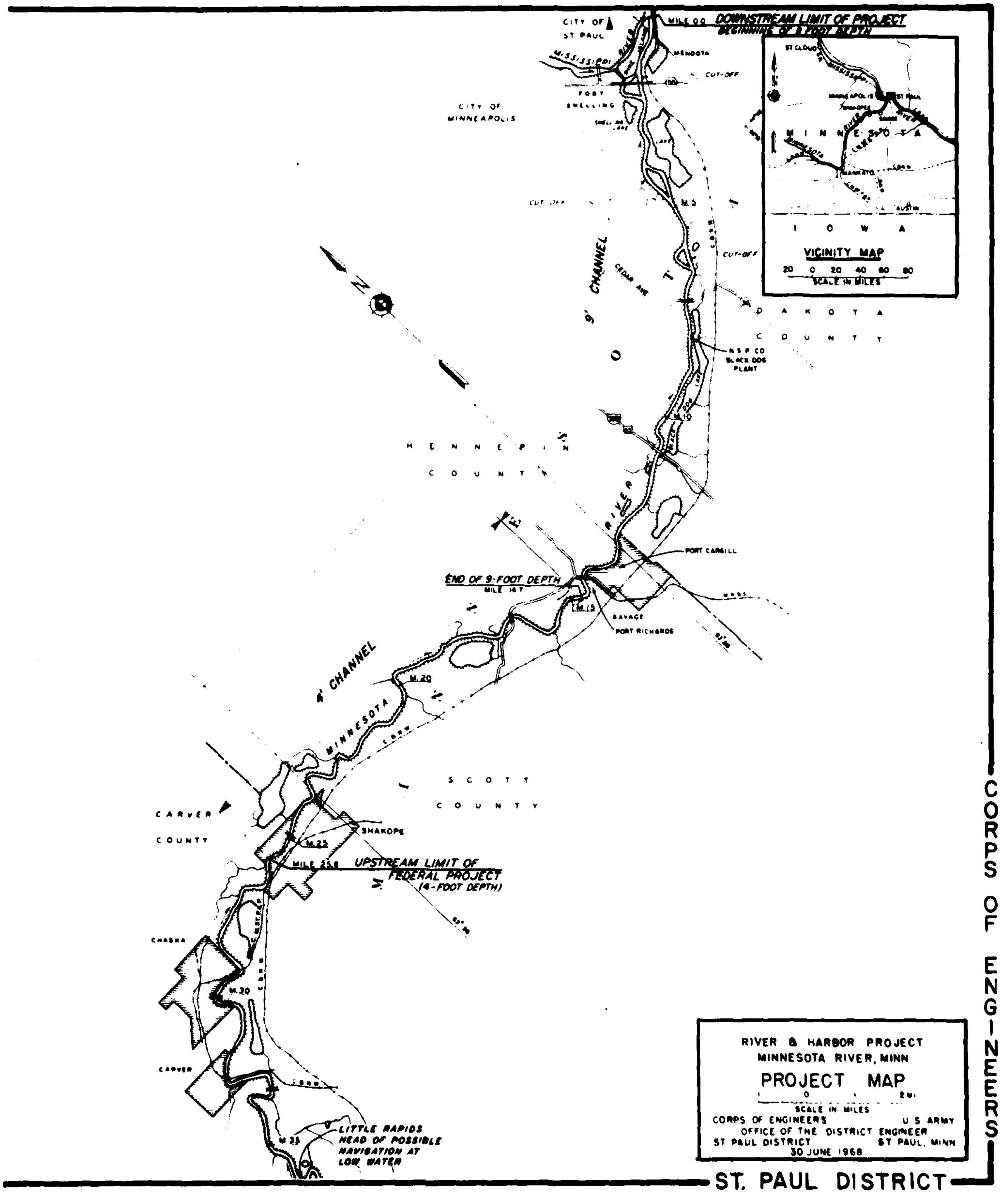
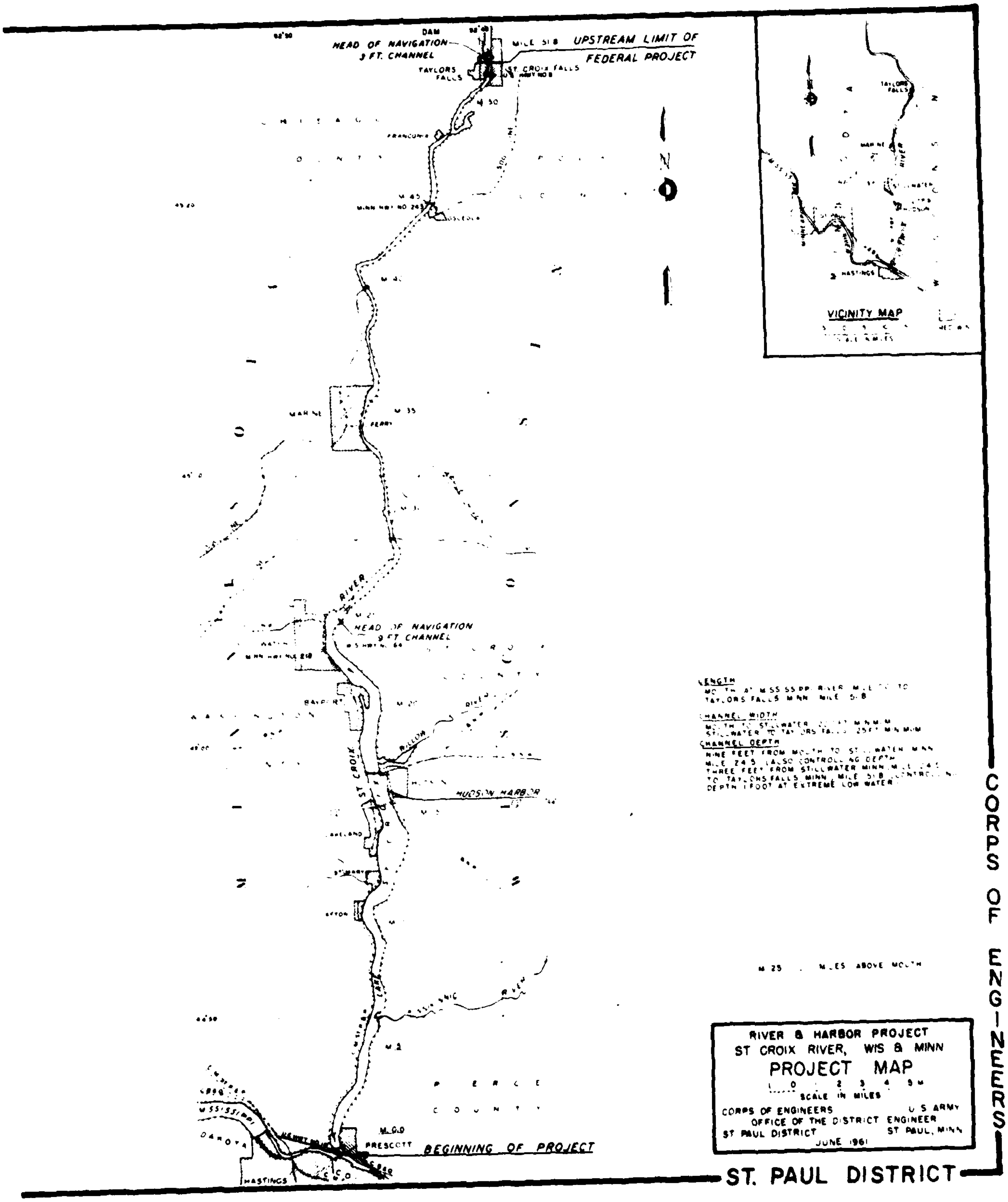

MILE 0.0 DOWNSTREAM LIMIT OF PROJECT
BEGINNING OF 9 FOOT DEPTH
CITY OF ST PAUL
MISSISSIPPI RIVER
MENDOTA
FORT SNELLING
CUT-OFF
CITY OF MINNEAPOLIS
9' CHANNEL
CEDAR AVE
M.5
M.10
M.15
M.20
M.25
M.30
M.35
DAKOTA COUNTY
N S P CO BLACK DOG PLANT
HENNEPIN COUNTY
PORT CARGILL
END OF 9-FOOT DEPTH
MILE 14.7
SAVAGE
PORT RICHARDS
4' CHANNEL
MINNESOTA
SCOTT COUNTY
CARVER COUNTY
SHAKOPEE
MILE 25.6
UPSTREAM LIMIT OF FEDERAL PROJECT (4-FOOT DEPTH)
CHASKA
CARVER
LITTLE RAPIDS HEAD OF POSSIBLE NAVIGATION AT LOW WATER
VICINITY MAP
ST CLOUD
MINNEAPOLIS
ST PAUL
MINNESOTA
MANKATO
AUSTIN
IOWA
20 0 20 40 60 80
SCALE IN MILES
RIVER & HARBOR PROJECT
MINNESOTA RIVER, MINN
PROJECT MAP
SCALE IN MILES
CORPS OF ENGINEERS U S ARMY
OFFICE OF THE DISTRICT ENGINEER
ST PAUL DISTRICT ST PAUL, MINN
30 JUNE 1968
CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 28



DAM
HEAD OF NAVIGATION
3 FT. CHANNEL
MILE 51.8
UPSTREAM LIMIT OF
FEDERAL PROJECT
TAYLORS FALLS
ST CROIX FALLS
M 50
FRANCONIA
M 45
OSCEOLA
MARINE
M 35
HEAD OF NAVIGATION
9 FT. CHANNEL
RIVER
BAYPORT
ST CROIX
WILLOW
HUDSON HARBOR
LAKELAND
AFTON
KINNICKINNIC
M 5
PIERCE
COUNTY
M 0.0
PRESCOTT
BEGINNING OF PROJECT
HASTINGS
DAKOTA
LENGTH
CHANNEL WIDTH
CHANNEL DEPTH
M 25 MILES ABOVE MOUTH
VICINITY MAP
HASTINGS
RIVER & HARBOR PROJECT
ST CROIX RIVER, WIS & MINN
PROJECT MAP
SCALE IN MILES
CORPS OF ENGINEERS
U S ARMY
OFFICE OF THE DISTRICT ENGINEER
ST PAUL DISTRICT
ST PAUL, MINN
JUNE 1961
CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 29

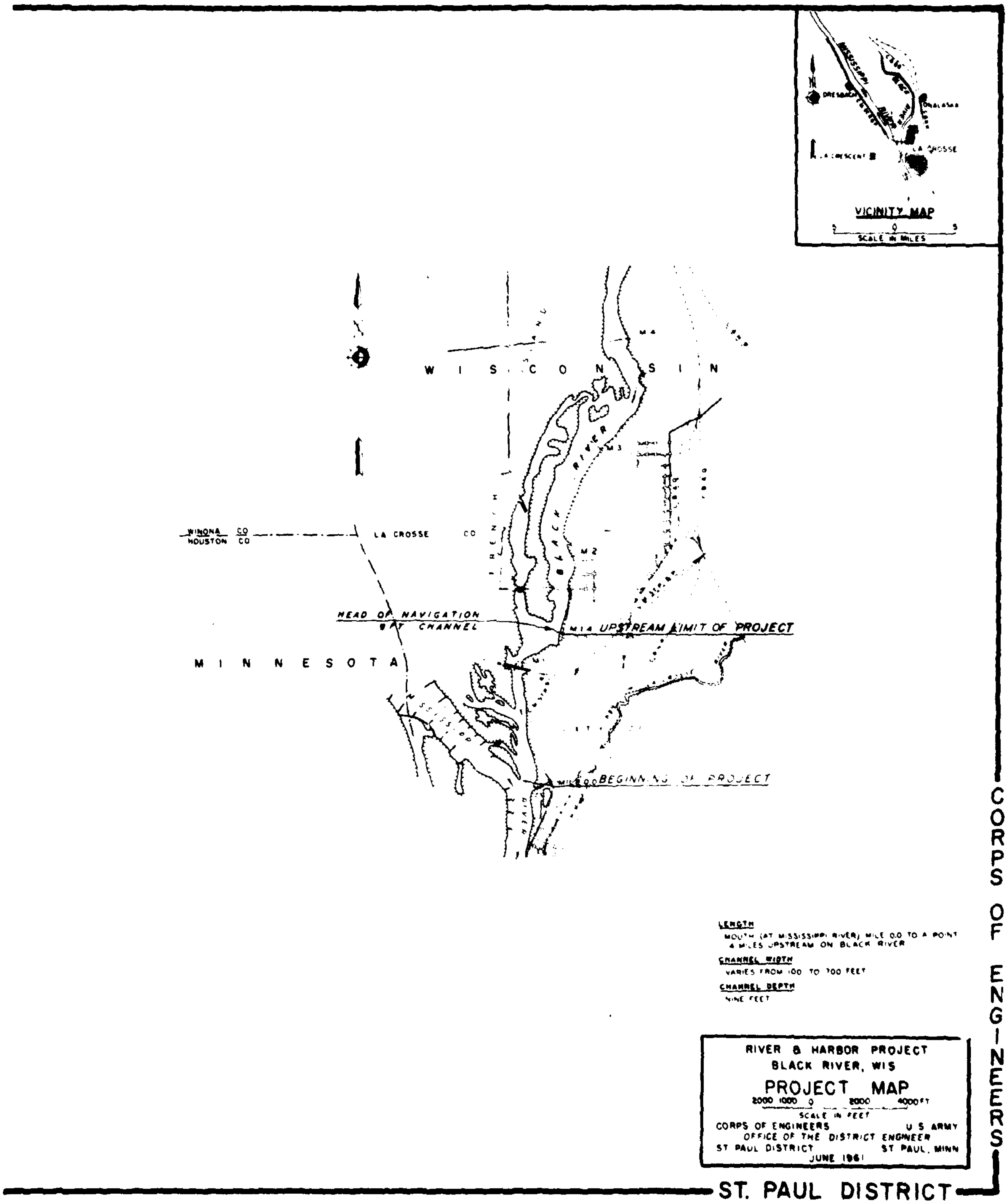
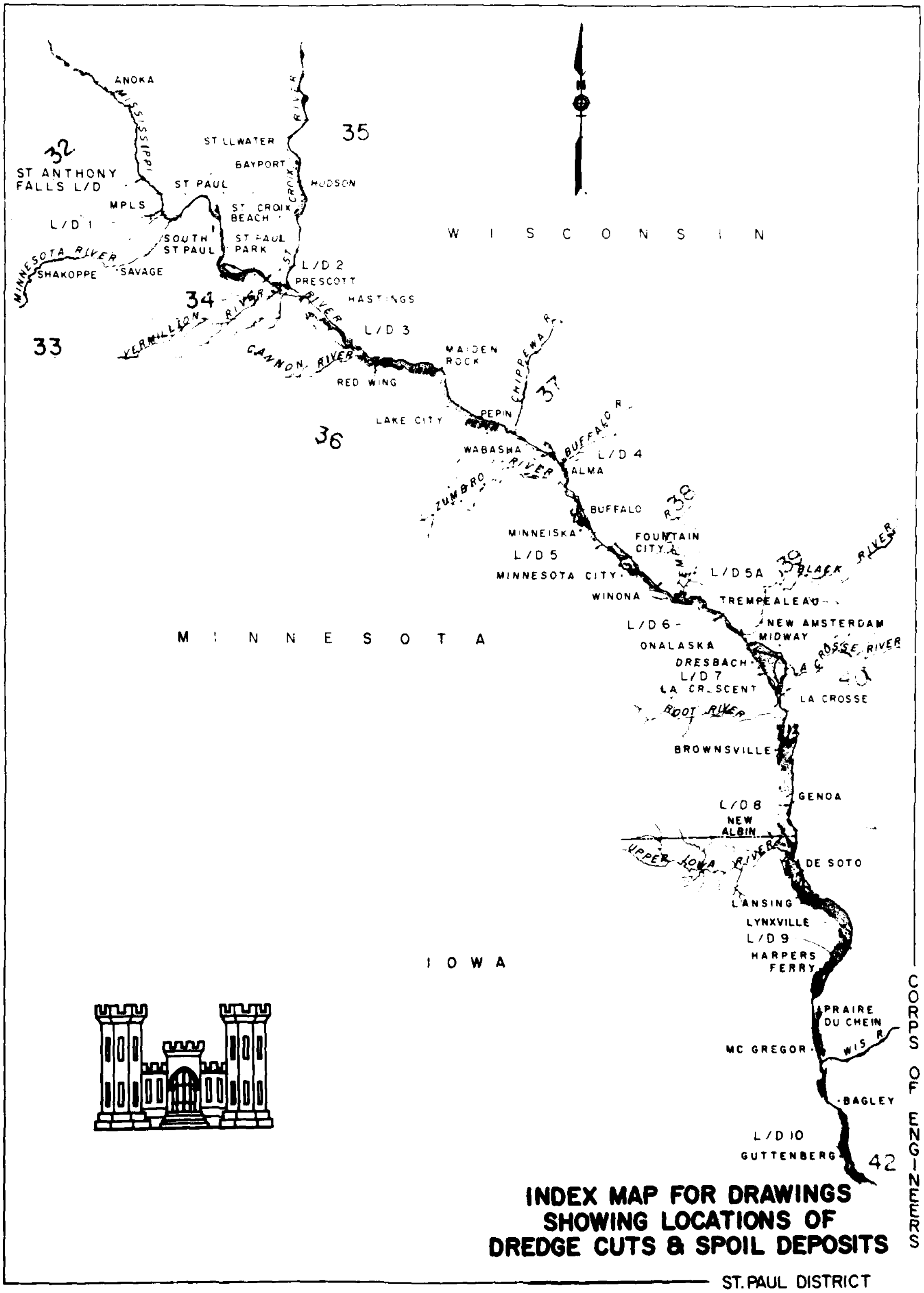
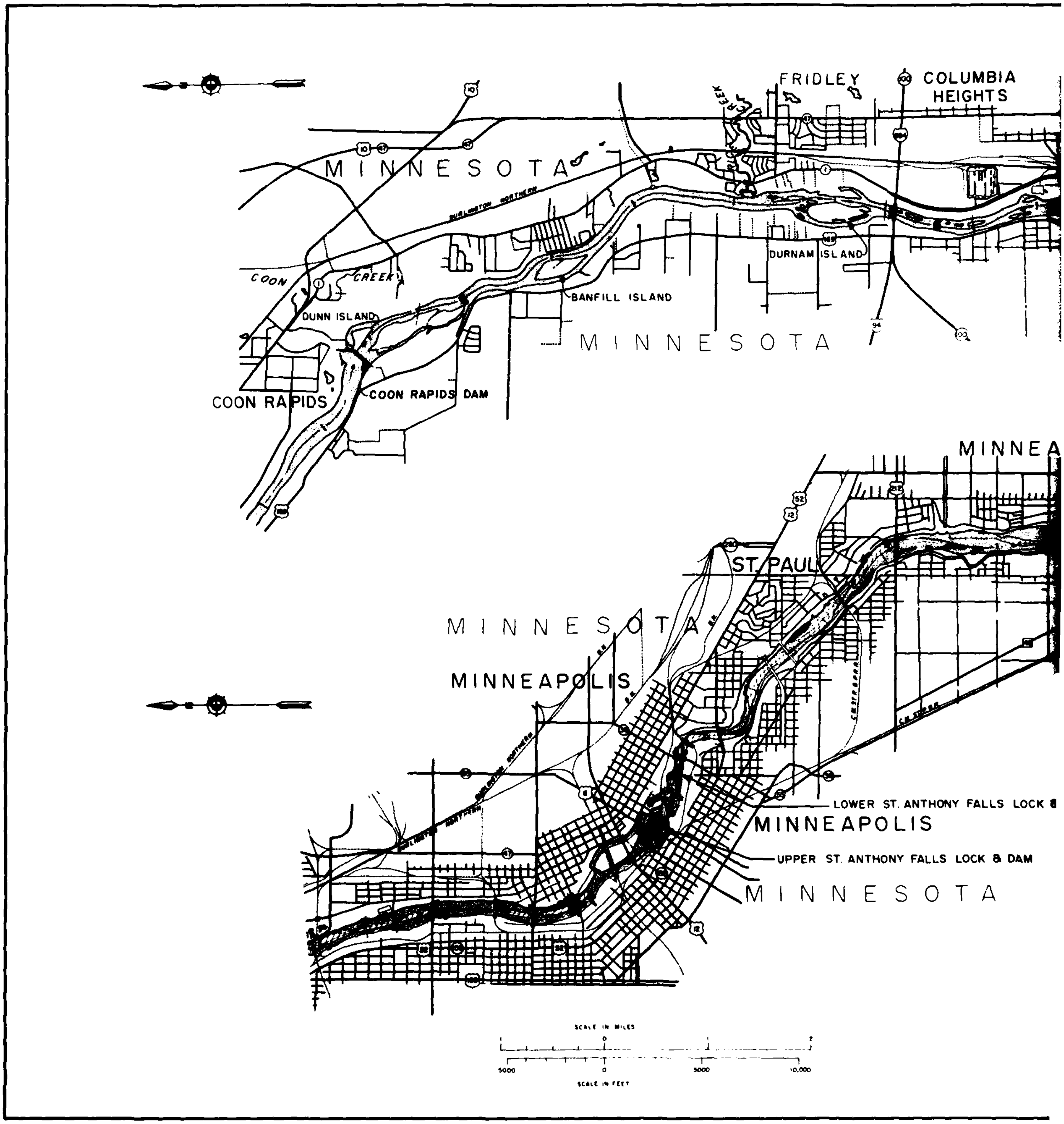

VICINITY MAP
SCALE IN MILES
WISCONSIN
MINNESOTA
WINONA CO
HOUSTON CO
LA CROSSE CO
BLACK RIVER
HEAD OF NAVIGATION 9 FT CHANNEL
UPSTREAM LIMIT OF PROJECT
BEGINNING OF PROJECT
LENGTH
MOUTH (AT MISSISSIPPI RIVER) MILE 0.0 TO A POINT 4 MILES UPSTREAM ON BLACK RIVER
CHANNEL WIDTH
VARIES FROM 100 TO 700 FEET
CHANNEL DEPTH
NINE FEET
RIVER & HARBOR PROJECT
BLACK RIVER, WIS
PROJECT MAP
SCALE IN FEET
CORPS OF ENGINEERS
U S ARMY
OFFICE OF THE DISTRICT ENGINEER
ST PAUL DISTRICT
ST PAUL, MINN
JUNE 1961
ST. PAUL DISTRICT
CORPS OF ENGINEERS

EXHIBIT 30

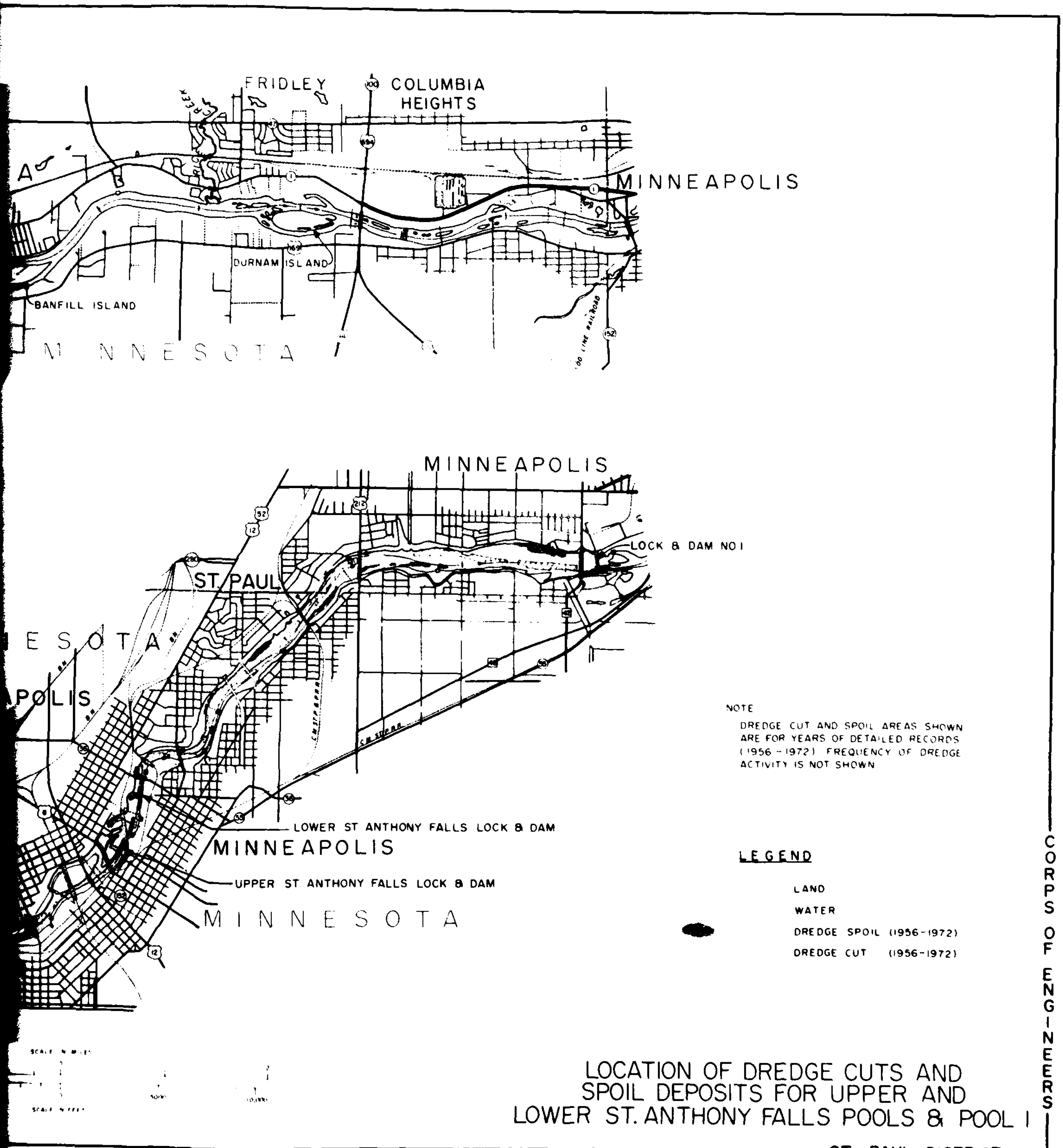


INDEX MAP FOR DRAWINGS SHOWING LOCATIONS OF DREDGE CUTS & SPOIL DEPOSITS

ST. PAUL DISTRICT
EXHIBIT 31

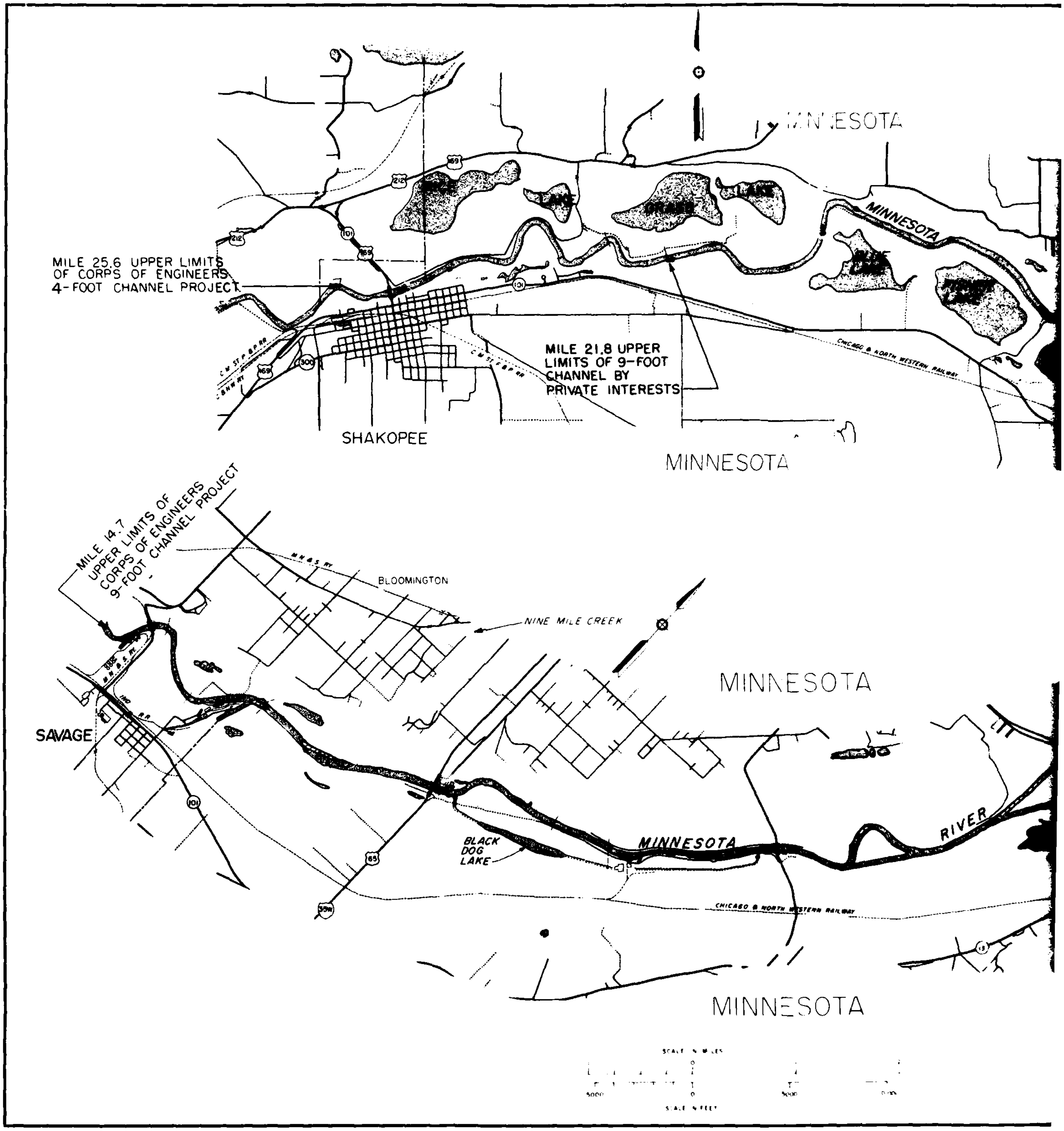


FRIDLEY
COLUMBIA HEIGHTS
MINNESOTA
BURLINGTON NORTHERN
COON CREEK
DUNN ISLAND
BANFILL ISLAND
DURNAM ISLAND
MINNESOTA
COON RAPIDS
COON RAPIDS DAM
MINNEA
ST. PAUL
MINNESOTA
MINNEAPOLIS
LOWER ST. ANTHONY FALLS LOCK &
MINNEAPOLIS
UPPER ST. ANTHONY FALLS LOCK & DAM
MINNESOTA
SCALE IN MILES
SCALE IN FEET

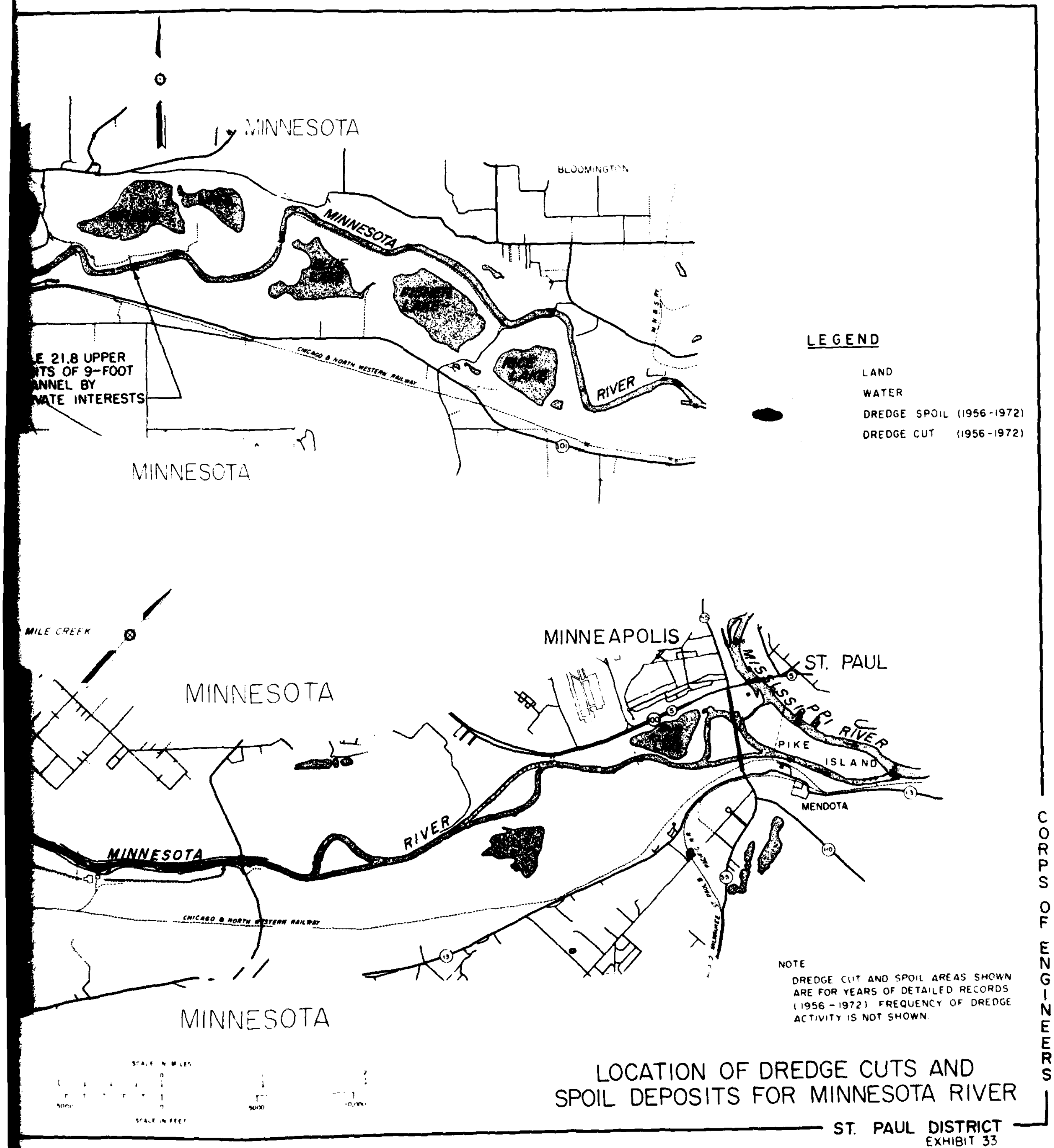


LOCATION OF DREDGE CUTS AND SPOIL DEPOSITS FOR UPPER AND LOWER ST. ANTHONY FALLS POOLS & POOL I

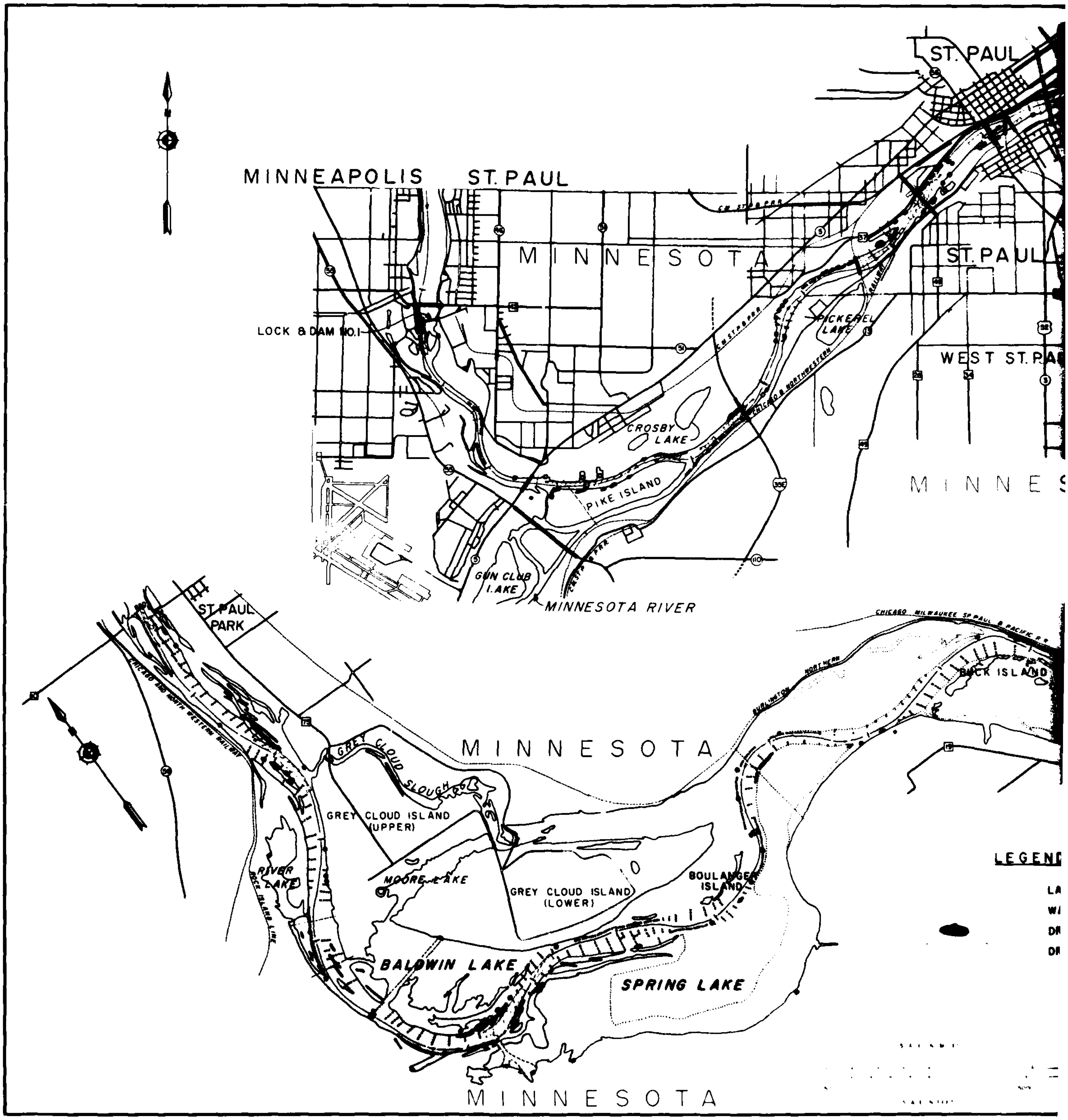
EXHIBIT 32



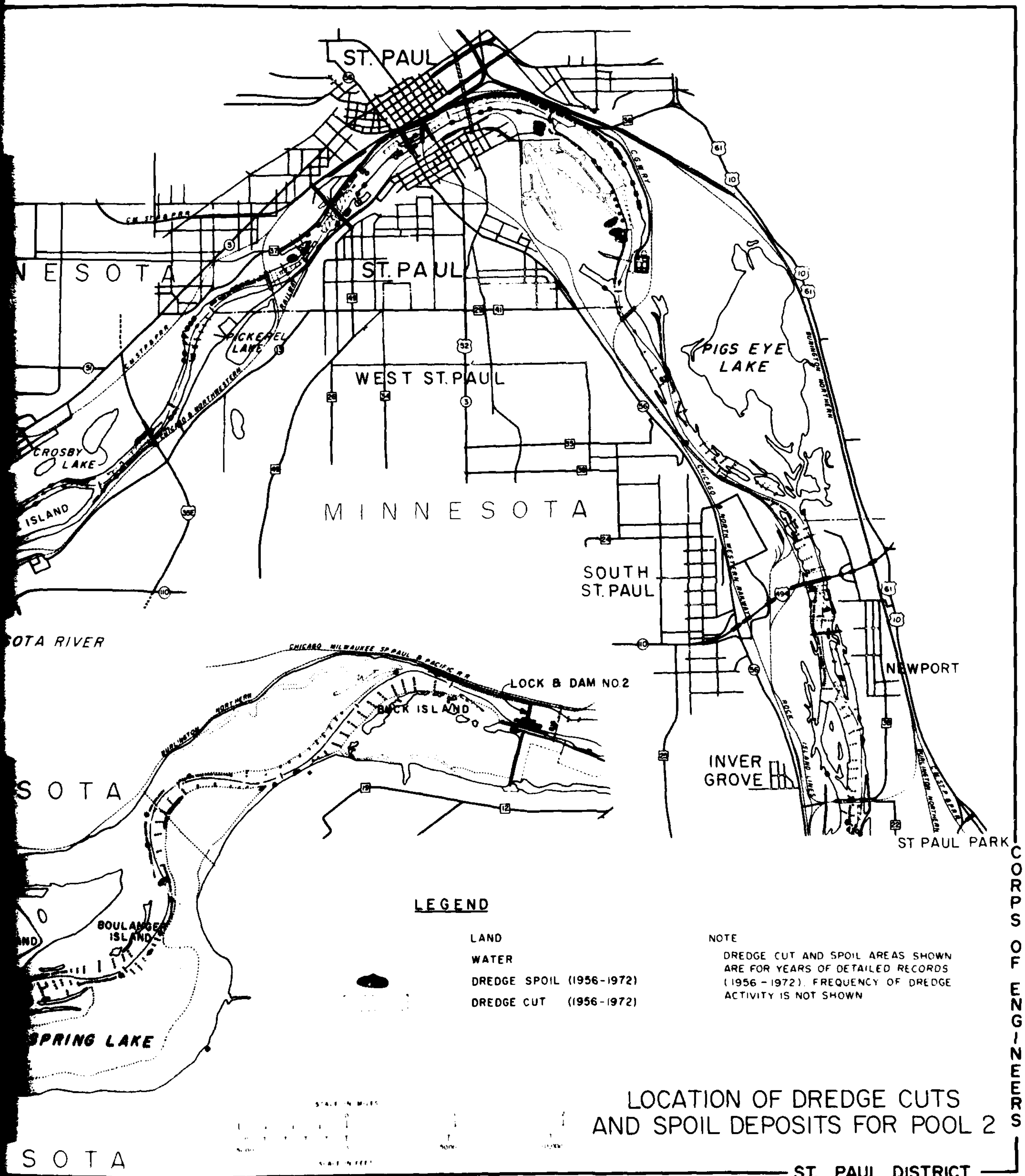
MINNESOTA
MINNESOTA
MILE 25.6 UPPER LIMITS OF CORPS OF ENGINEERS 4-FOOT CHANNEL PROJECT
MILE 21.8 UPPER LIMITS OF 9-FOOT CHANNEL BY PRIVATE INTERESTS
CHICAGO & NORTH WESTERN RAILWAY
SHAKOPEE
MINNESOTA
MILE 14.7 UPPER LIMITS OF CORPS OF ENGINEERS 9-FOOT CHANNEL PROJECT
BLOOMINGTON
NINE MILE CREEK
MINNESOTA
SAVAGE
BLACK DOG LAKE
MINNESOTA
RIVER
CHICAGO & NORTH WESTERN RAILWAY
MINNESOTA



LOCATION OF DREDGE CUTS AND SPOIL DEPOSITS FOR MINNESOTA RIVER

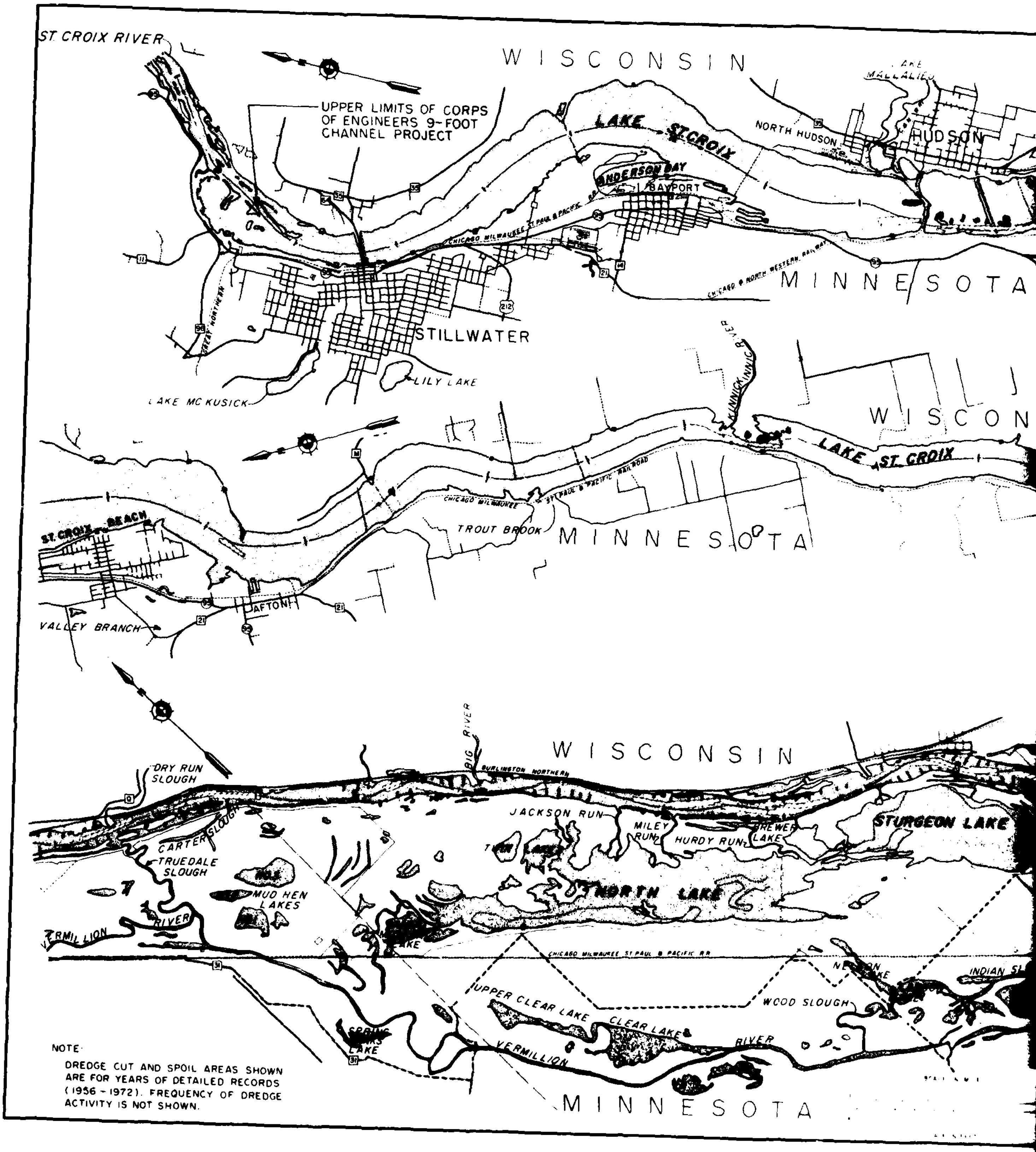


MINNEAPOLIS
ST. PAUL
MINNESOTA
ST. PAUL
LOCK & DAM NO.1
PICKEREL LAKE
WEST ST. PA
CROSBY LAKE
PIKE ISLAND
MINNES
GUN CLUB LAKE
MINNESOTA RIVER
ST. PAUL PARK
CHICAGO MILWAUKEE ST. PAUL & PACIFIC R.R.
CHICAGO AND NORTH WESTERN RAILWAY
BURLINGTON NORTHERN
MINNESOTA
GREY CLOUD SLOUGH
GREY CLOUD ISLAND (UPPER)
RIVER LAKE
ROCK ISLAND LINE
MOORE LAKE
GREY CLOUD ISLAND (LOWER)
BOULANGER ISLAND
BALDWIN LAKE
SPRING LAKE
LEGEND
MINNESOTA

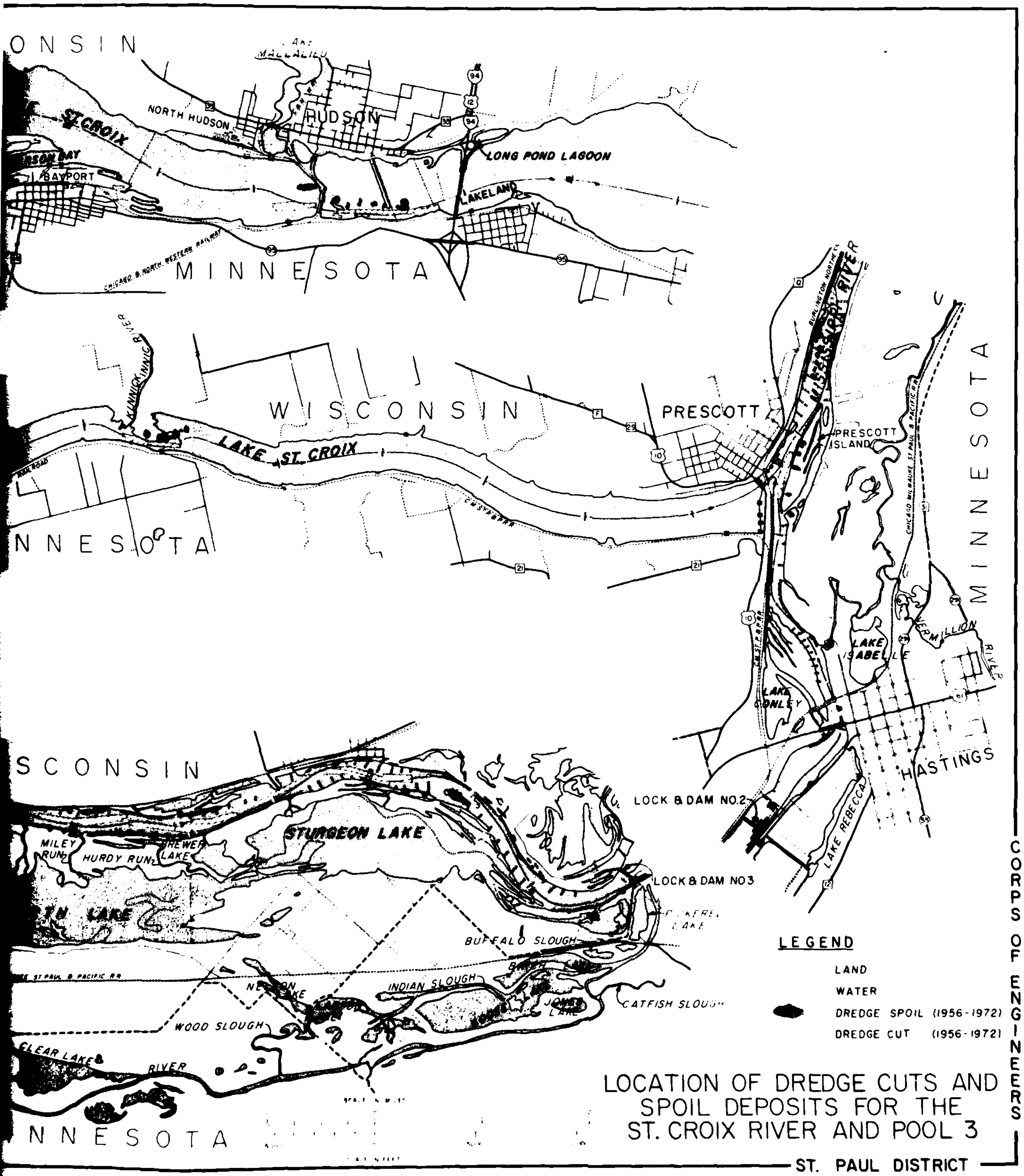


LOCATION OF DREDGE CUTS AND SPOIL DEPOSITS FOR POOL 2

EXHIBIT 34



NOTE:
DREDGE CUT AND SPOIL AREAS SHOWN ARE FOR YEARS OF DETAILED RECORDS (1956 - 1972). FREQUENCY OF DREDGE ACTIVITY IS NOT SHOWN.

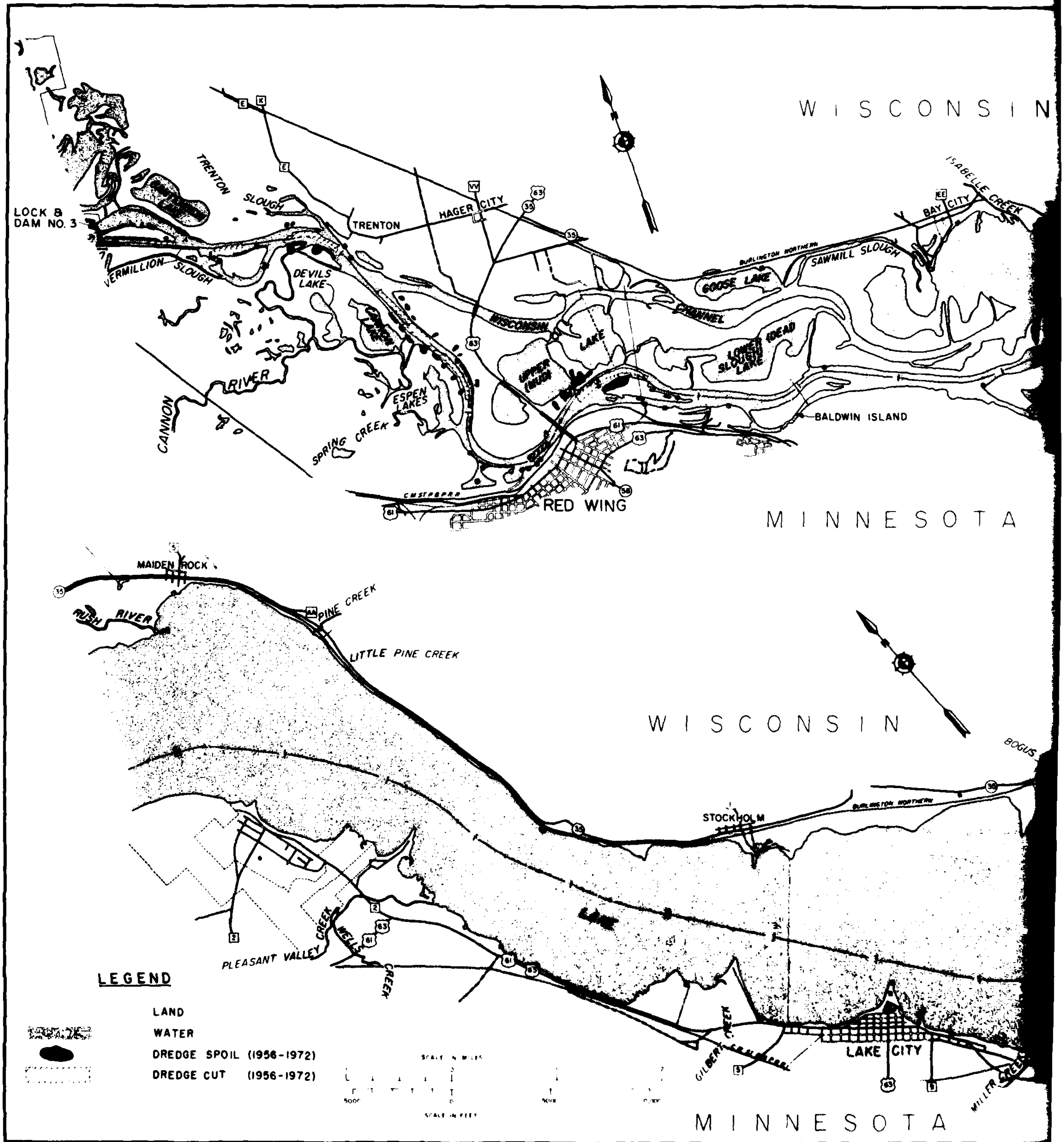


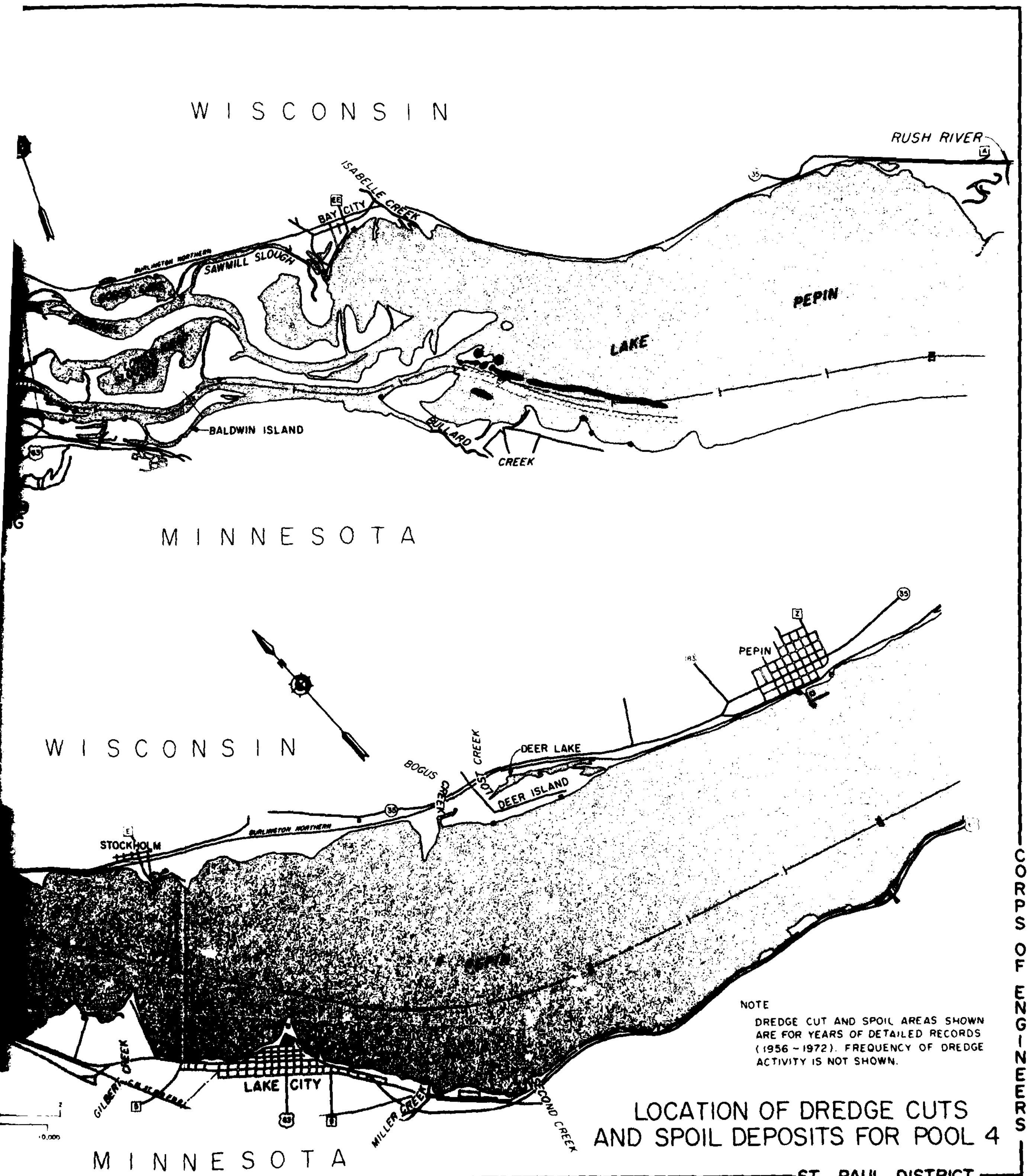
LOCATION OF DREDGE CUTS AND SPOIL DEPOSITS FOR THE ST. CROIX RIVER AND POOL 3

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 35


WISCONSIN
MINNESOTA
LOCK & DAM NO. 3
TRENTON SLOUGH
TRENTON
HAGER CITY
VERMILLION SLOUGH
DEVILS LAKE
WISCONSIN
CHANNEL
GOOSE LAKE
SAWMILL SLOUGH
BAY CITY
ISABELLE CREEK
BURLINGTON NORTHERN
UPPER (MUD) LAKE
LOWER SLOUGH LAKE
(DEAD
BALDWIN ISLAND
CANNON RIVER
ESPEN LAKES
SPRING CREEK
RED WING
MAIDEN ROCK
RUSH RIVER
PINE CREEK
LITTLE PINE CREEK
WISCONSIN
BOGUS
STOCKHOLM
LAKE
PLEASANT VALLEY CREEK
WELLS CREEK
GILBERT CREEK
LAKE CITY
MILLER CREEK
MINNESOTA
LEGEND
LAND
WATER
DREDGE SPOIL (1956-1972)
DREDGE CUT (1956-1972)



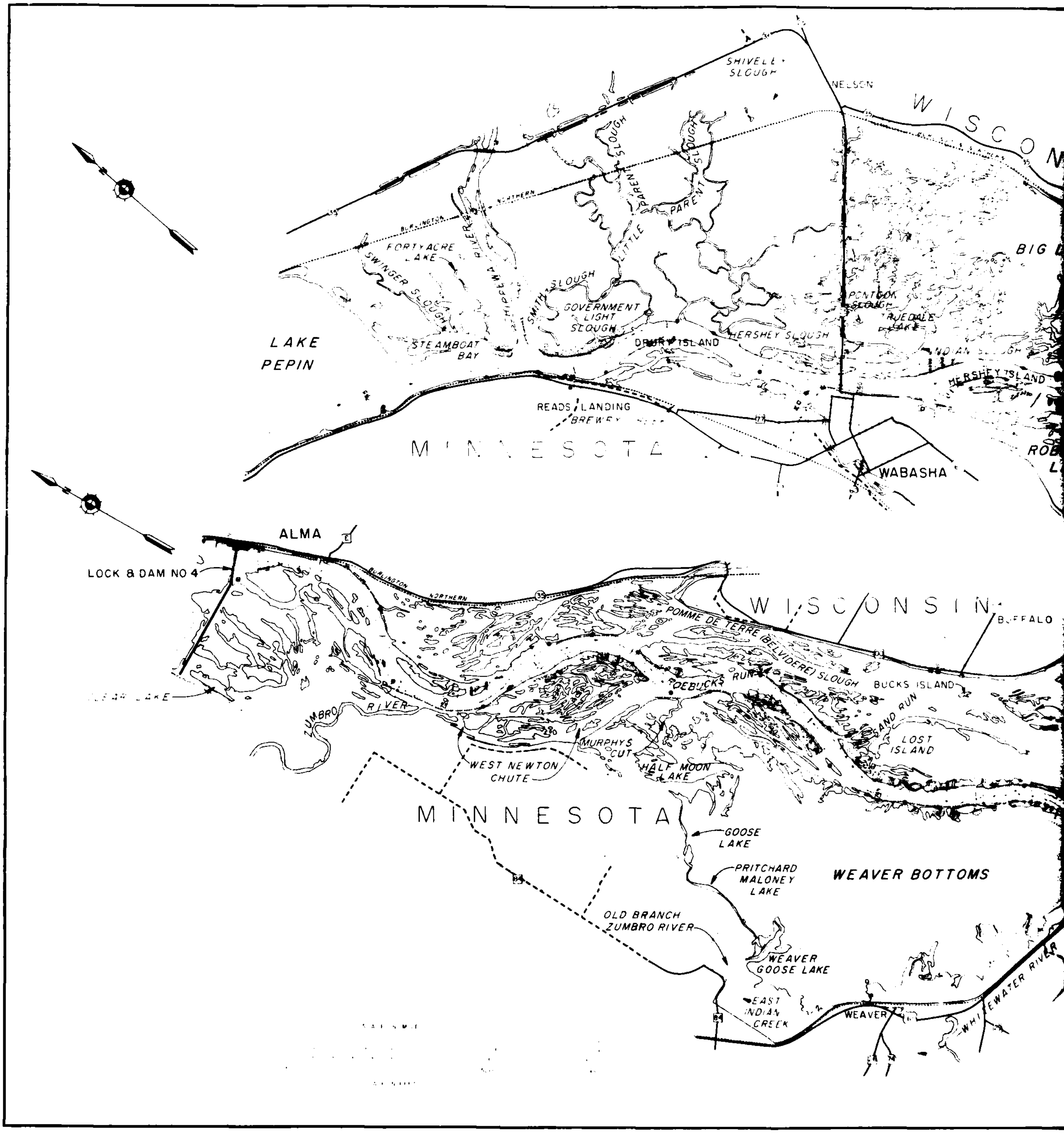
NOTE
DREDGE CUT AND SPOIL AREAS SHOWN ARE FOR YEARS OF DETAILED RECORDS (1956 - 1972). FREQUENCY OF DREDGE ACTIVITY IS NOT SHOWN.

LOCATION OF DREDGE CUTS AND SPOIL DEPOSITS FOR POOL 4

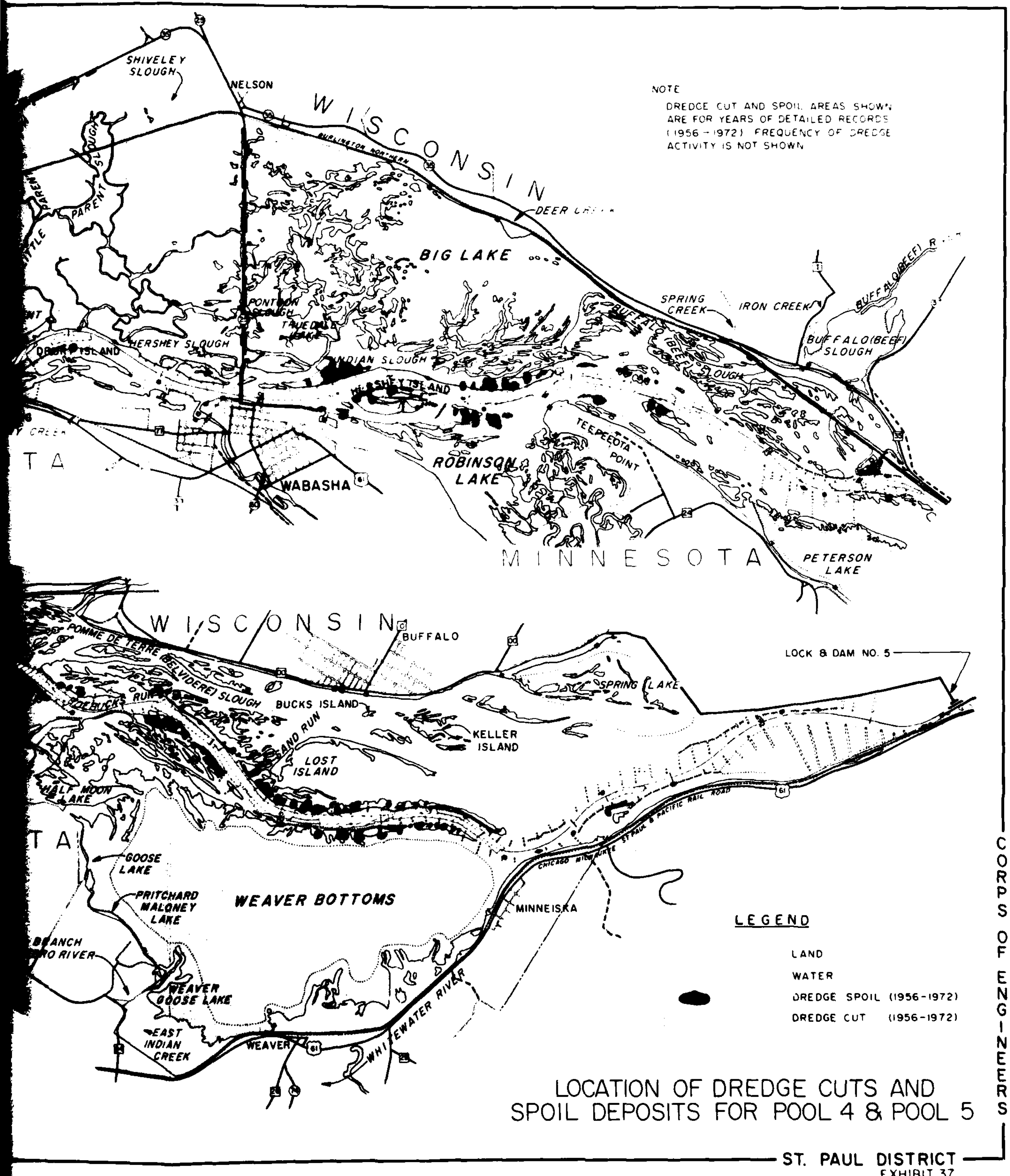
CORPS OF ENGINEERS

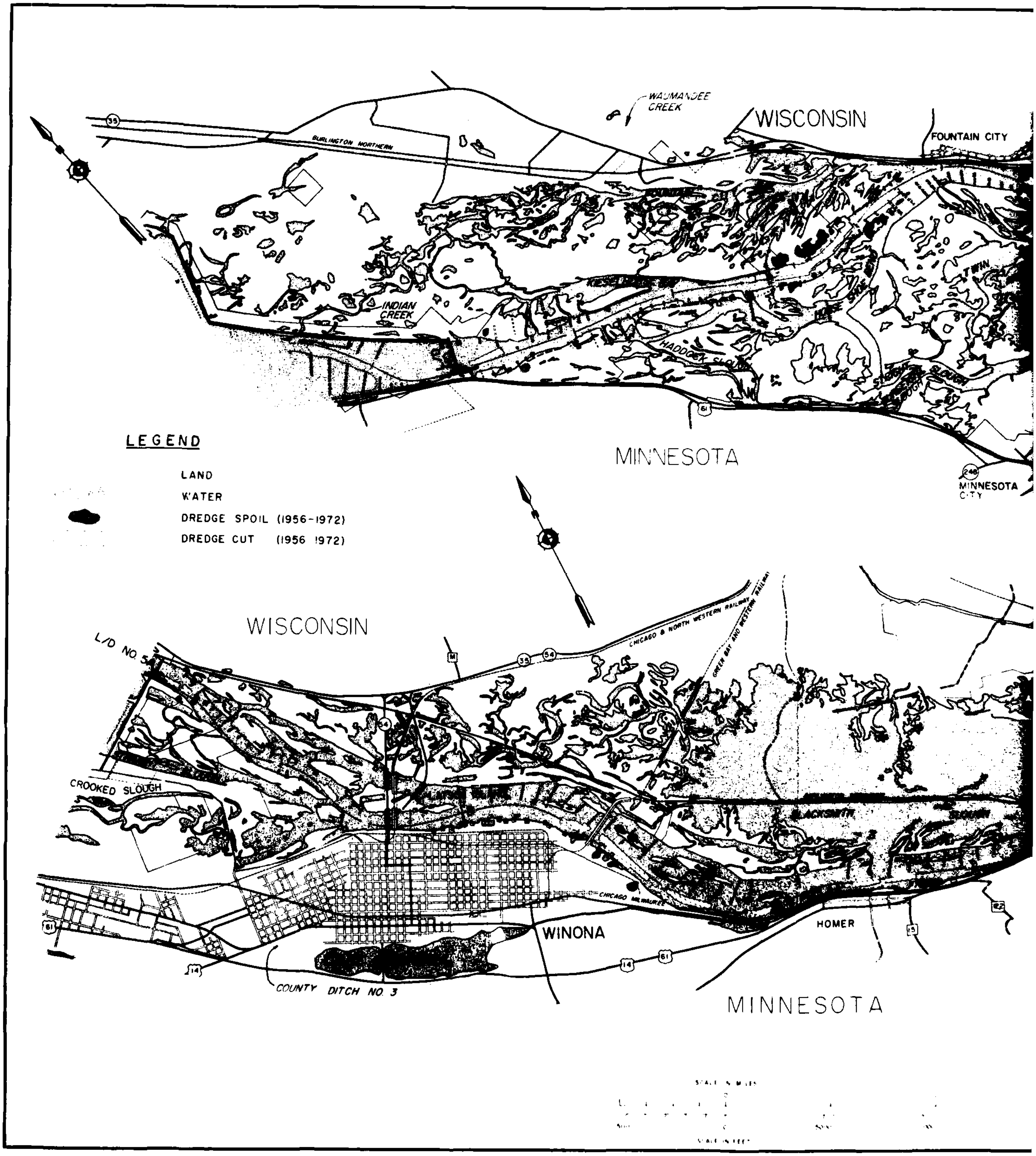
ST. PAUL DISTRICT

EXHIBIT 36

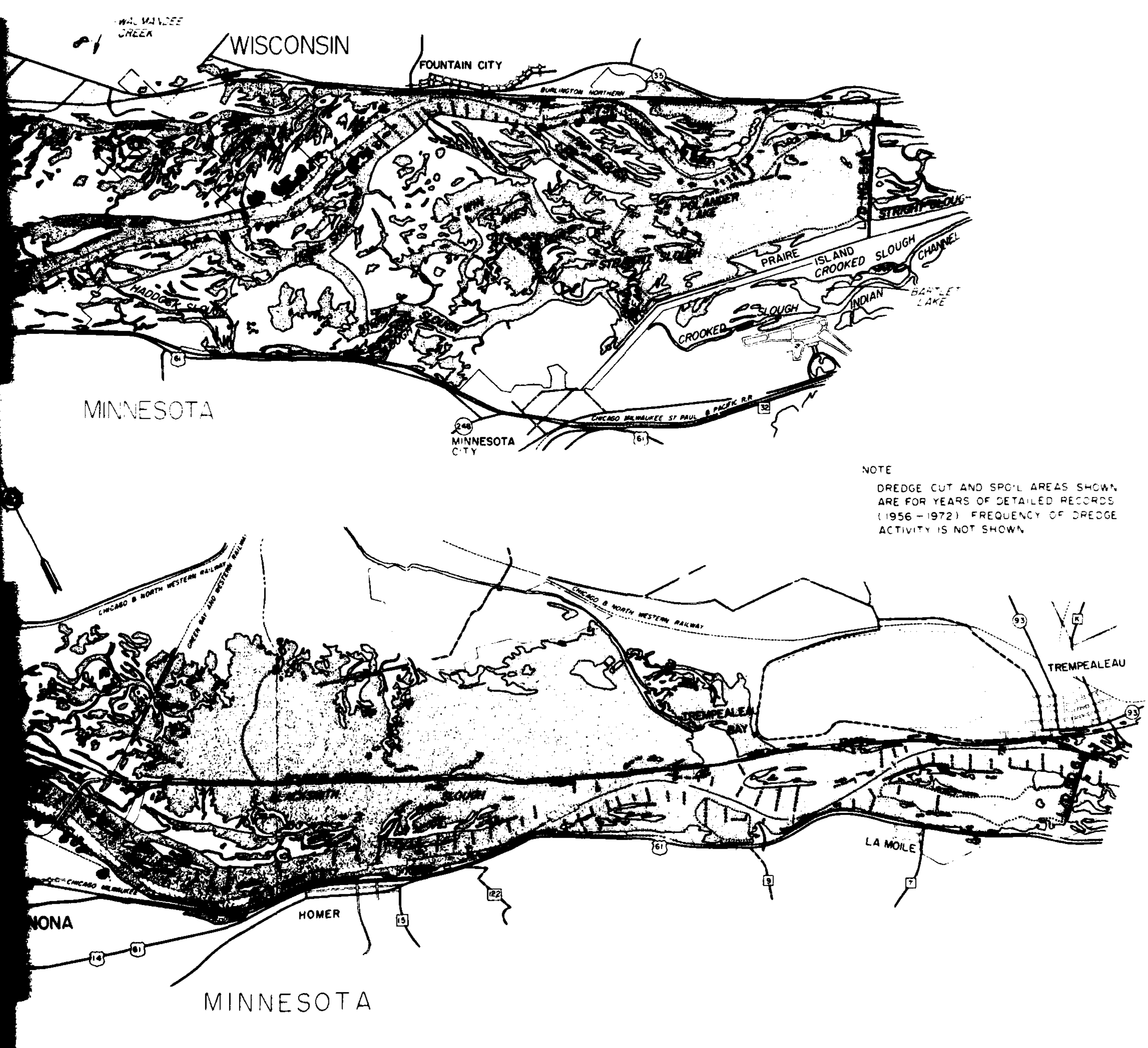


SHIVELEY SLOUGH
NELSON
WISCON
BURLINGTON NORTHERN
FORTYACRE LAKE
SWINGER SLOUGH
CHIPPEWA RIVER
SMITH SLOUGH
LITTLE PARENT SLOUGH
PARENT SLOUGH
GOVERNMENT LIGHT SLOUGH
BIG
PONTOON SLOUGH
TRUEDALE LAKE
LAKE PEPIN
STEAMBOAT BAY
DRURY ISLAND
HERSHEY SLOUGH
INDIAN SLOUGH
HERSHEY ISLAND
READS LANDING
MINNESOTA
WABASHA
ALMA
LOCK & DAM NO 4
BURLINGTON NORTHERN
WISCONSIN
BUFFALO
POMME DE TERRE (BELVIDERE) SLOUGH
ROEBUCKS RUN
BUCKS ISLAND
SAND RUN
LOST ISLAND
ZUMBRO RIVER
MURPHYS CUT
WEST NEWTON CHUTE
HALF MOON LAKE
MINNESOTA
GOOSE LAKE
PRITCHARD MALONEY LAKE
WEAVER BOTTOMS
OLD BRANCH ZUMBRO RIVER
WEAVER GOOSE LAKE
EAST INDIAN CREEK
WEAVER
WHITEWATER RIVER


NOTE
DREDGE CUT AND SPOIL AREAS SHOWN ARE FOR YEARS OF DETAILED RECORDS (1956 – 1972). FREQUENCY OF DREDGE ACTIVITY IS NOT SHOWN.
WISCONSIN
MINNESOTA
SHIVELEY SLOUGH
NELSON
BIG LAKE
DEER CREEK
SPRING CREEK
IRON CREEK
BUFFALO (BEEF) SLOUGH
HERSHEY SLOUGH
INDIAN SLOUGH
ROBINSON LAKE
TEEPEEOTA POINT
WABASHA
PETERSON LAKE
BUFFALO
LOCK & DAM NO. 5
POMME DE TERRE (BELVIDERE) SLOUGH
BUCKS ISLAND
SPRING LAKE
KELLER ISLAND
LOST ISLAND
HALF MOON LAKE
GOOSE LAKE
PRITCHARD MALONEY LAKE
WEAVER BOTTOMS
MINNEISKA
WEAVER GOOSE LAKE
EAST INDIAN CREEK
WEAVER
WHITEWATER RIVER
LEGEND
LAND
WATER
DREDGE SPOIL (1956-1972)
DREDGE CUT (1956-1972)
LOCATION OF DREDGE CUTS AND SPOIL DEPOSITS FOR POOL 4 & POOL 5
CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 37



WAUMANDEE CREEK
WISCONSIN
FOUNTAIN CITY
BURLINGTON NORTHERN
INDIAN CREEK
HADDOCK SLOUGH
MINNESOTA
MINNESOTA CITY
LEGEND
LAND
WATER
DREDGE SPOIL (1956-1972)
DREDGE CUT (1956 1972)
WISCONSIN
L/D NO. 5A
CHICAGO & NORTH WESTERN RAILWAY
GREEN BAY AND WESTERN RAILROAD
CROOKED SLOUGH
BLACKSMITH SLOUGH
CHICAGO MILWAUKEE
WINONA
HOMER
COUNTY DITCH NO. 3
MINNESOTA

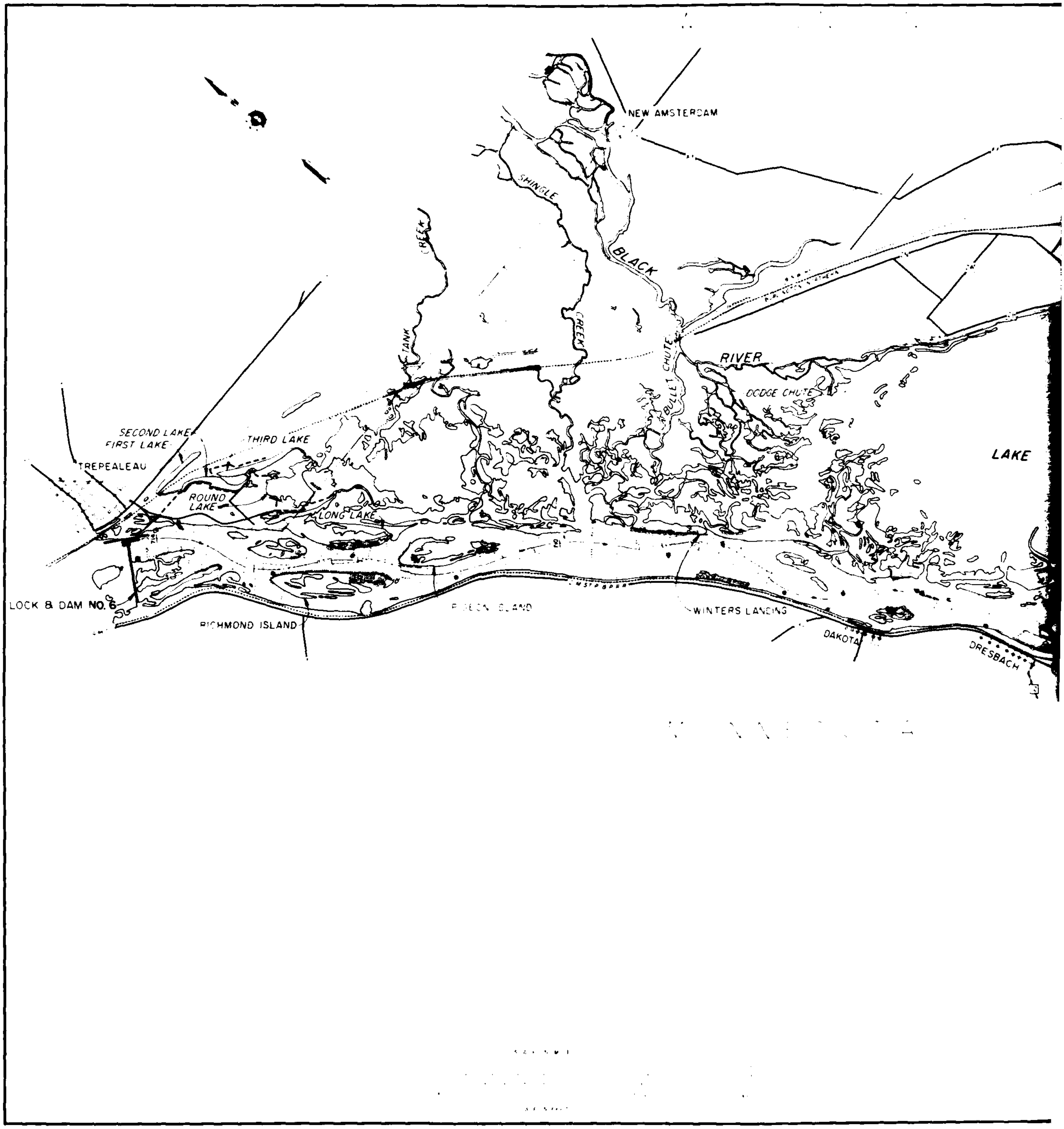


LOCATION OF DREDGE CUTS AND SPOIL DEPOSITS FOR POOL 5A & POOL 6

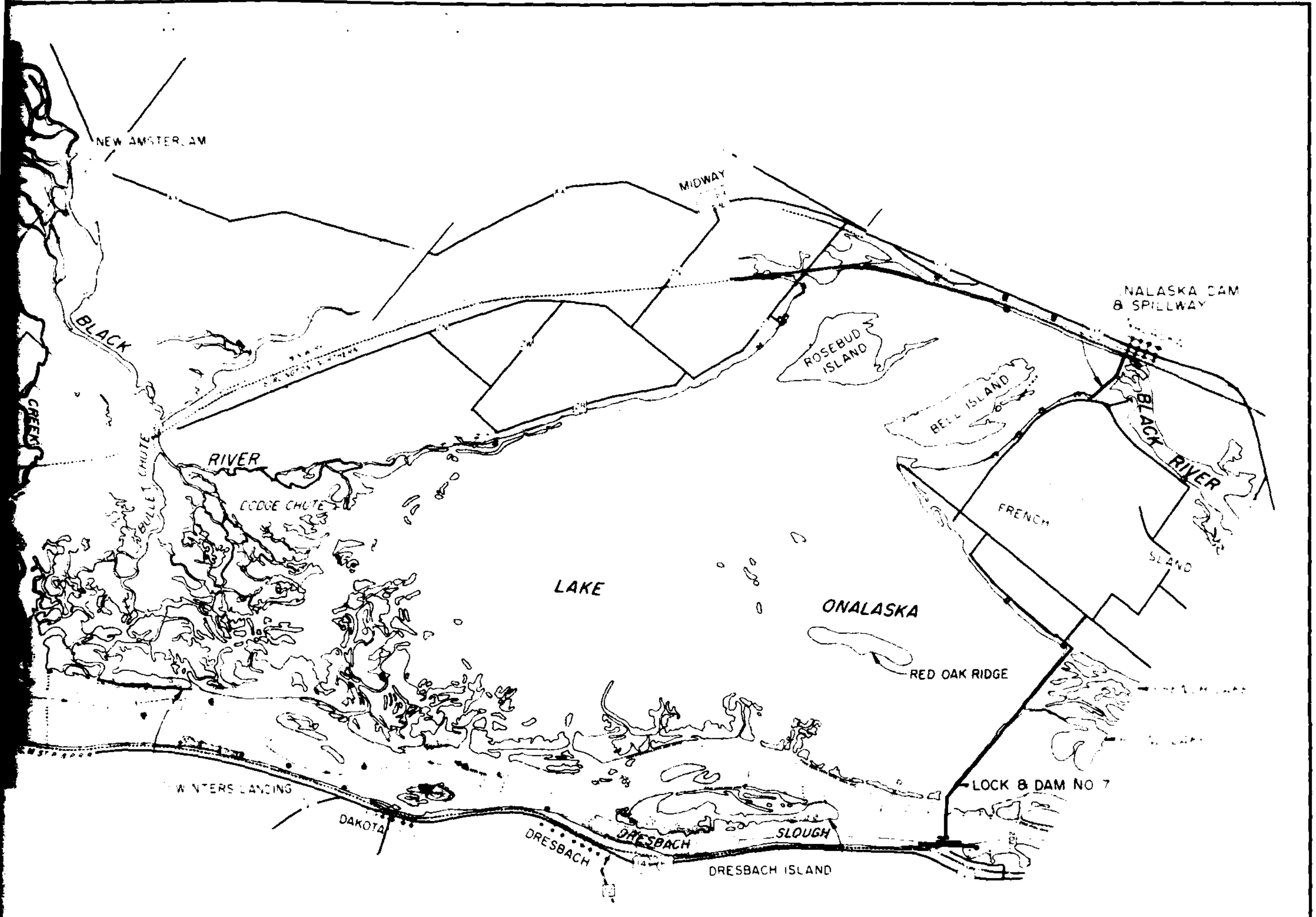
CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 38



NEW AMSTERDAM
SHINGLE
CREEK
TANK
CREEK
BLACK
RIVER
BULLET CHUTE
DODGE CHUTE
LAKE
SECOND LAKE
FIRST LAKE
THIRD LAKE
TREPEALEAU
ROUND LAKE
LONG LAKE
LOCK & DAM NO. 6
RICHMOND ISLAND
WINTERS LANDING
DAKOTA
DRESBACH



NOTE
DREDGE CUT AND SPOIL AREAS SHOWN ARE FOR YEARS OF DETAILED RECORDS (1956 - 1972). FREQUENCY OF DREDGE ACTIVITY IS NOT SHOWN.

LEGEND

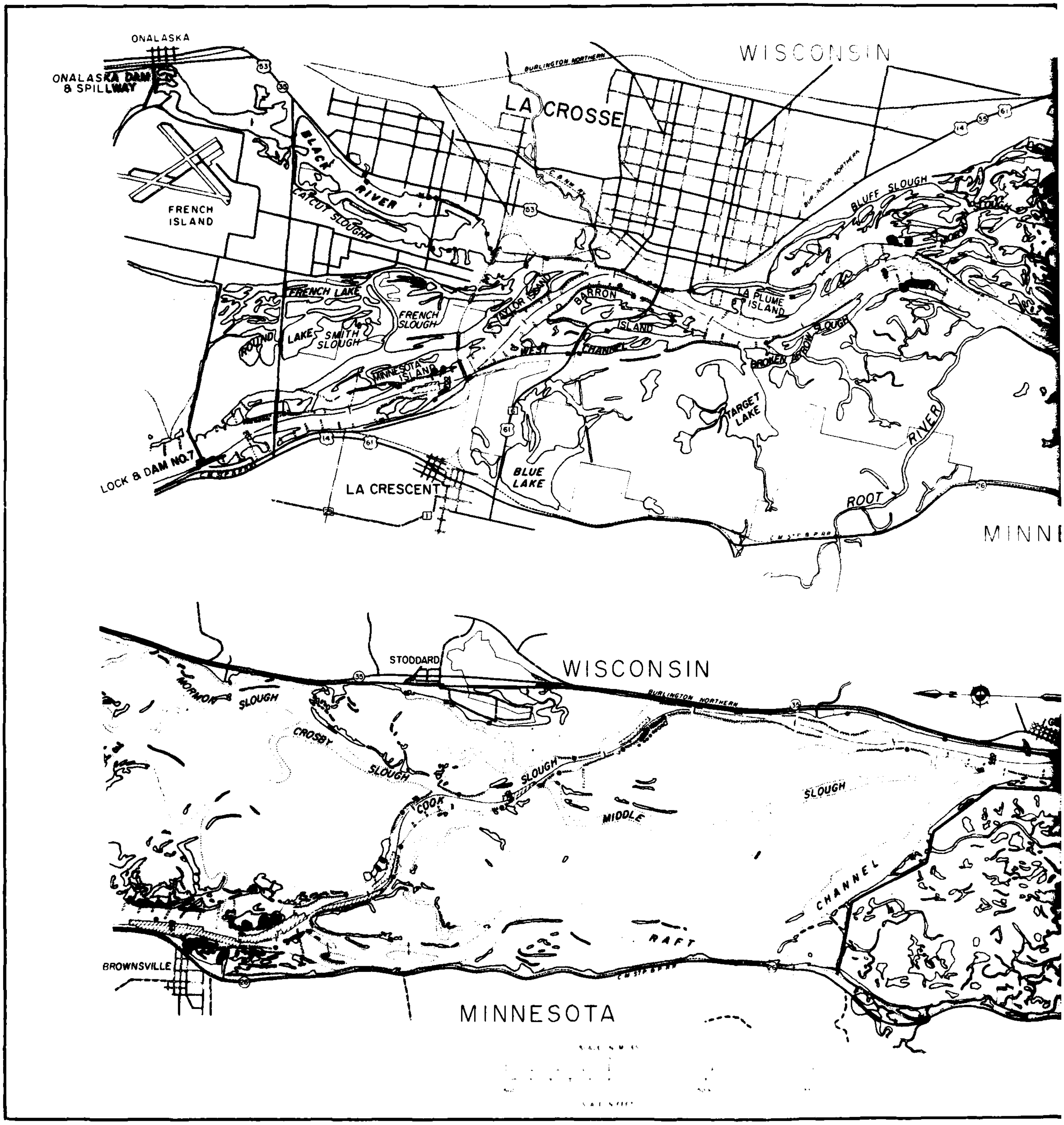
LAND
WATER
DREDGE SPOIL (1956-1972)
DREDGE CUT (1956-1972)

LOCATION OF DREDGE CUTS AND SPOIL DEPOSITS FOR POOL 7

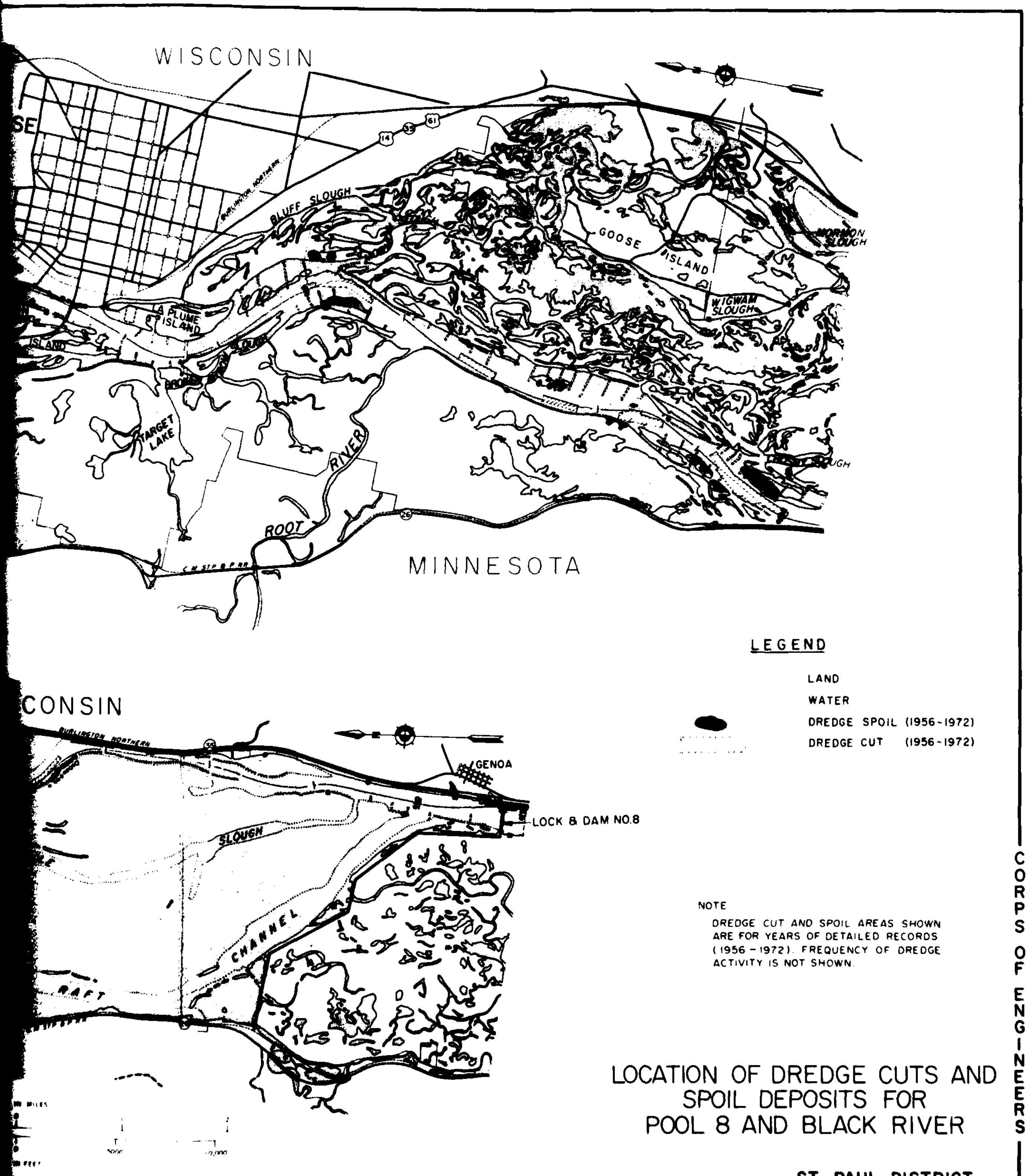
CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 3-3



ONALASKA
ONALASKA DAM & SPILLWAY
WISCONSIN
BURLINGTON NORTHERN
LA CROSSE
FRENCH ISLAND
BLACK RIVER
LATCUT SLOUGH
BLUFF SLOUGH
FRENCH LAKE
FRENCH SLOUGH
ROUND LAKE
SMITH SLOUGH
MINNESOTA ISLAND
TAYLOR ISLAND
BARRON ISLAND
WEST CHANNEL
LA PLUME ISLAND
BROKEN ARROW SLOUGH
TARGET LAKE
ROOT RIVER
BLUE LAKE
LOCK & DAM NO.7
LA CRESCENT
MINNE
STODDARD
WISCONSIN
BURLINGTON NORTHERN
MORMON SLOUGH
CROSBY SLOUGH
COOK SLOUGH
MIDDLE SLOUGH
CHANNEL
RAFT
BROWNSVILLE
MINNESOTA

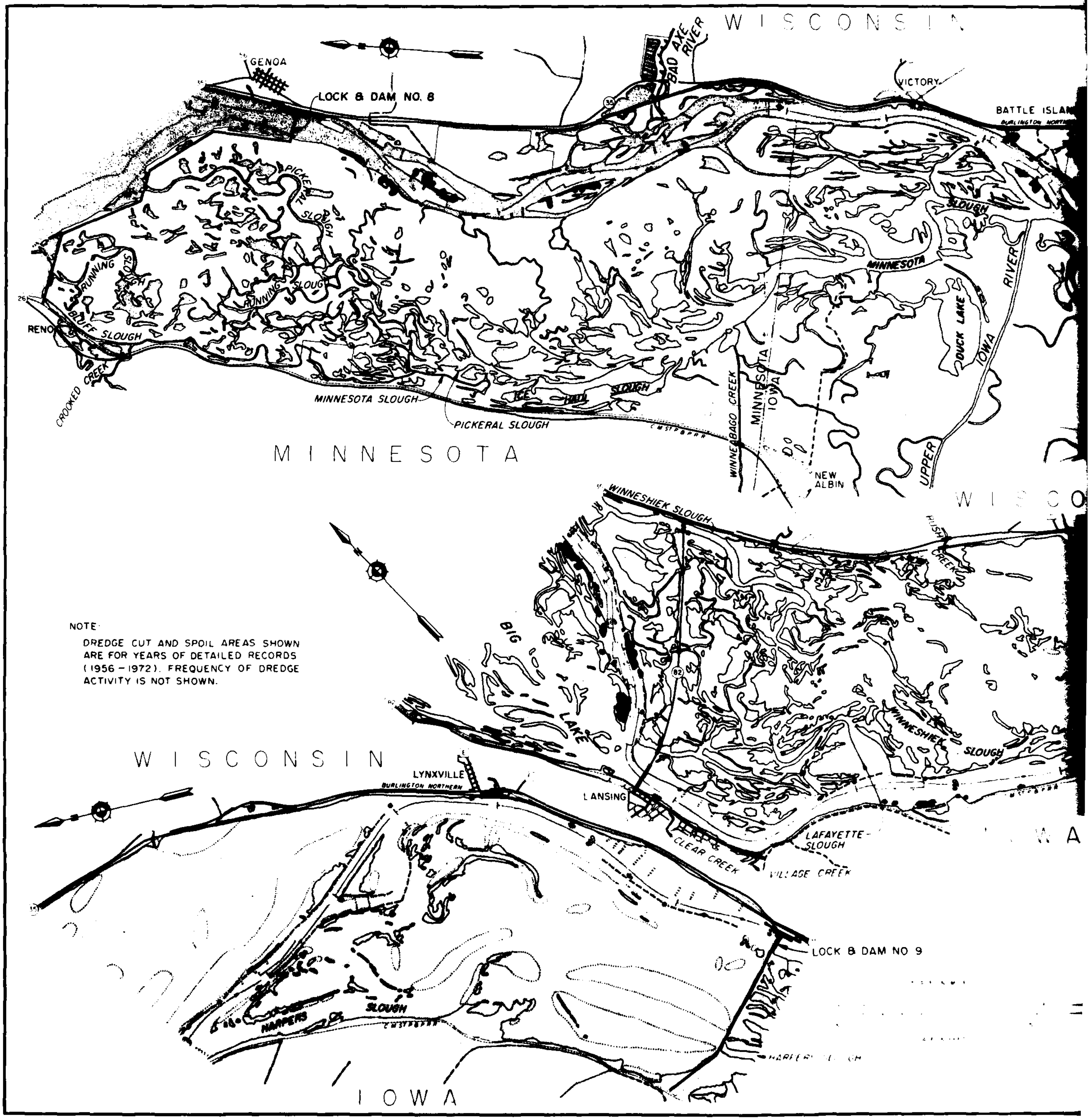


LOCATION OF DREDGE CUTS AND SPOIL DEPOSITS FOR POOL 8 AND BLACK RIVER

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 40

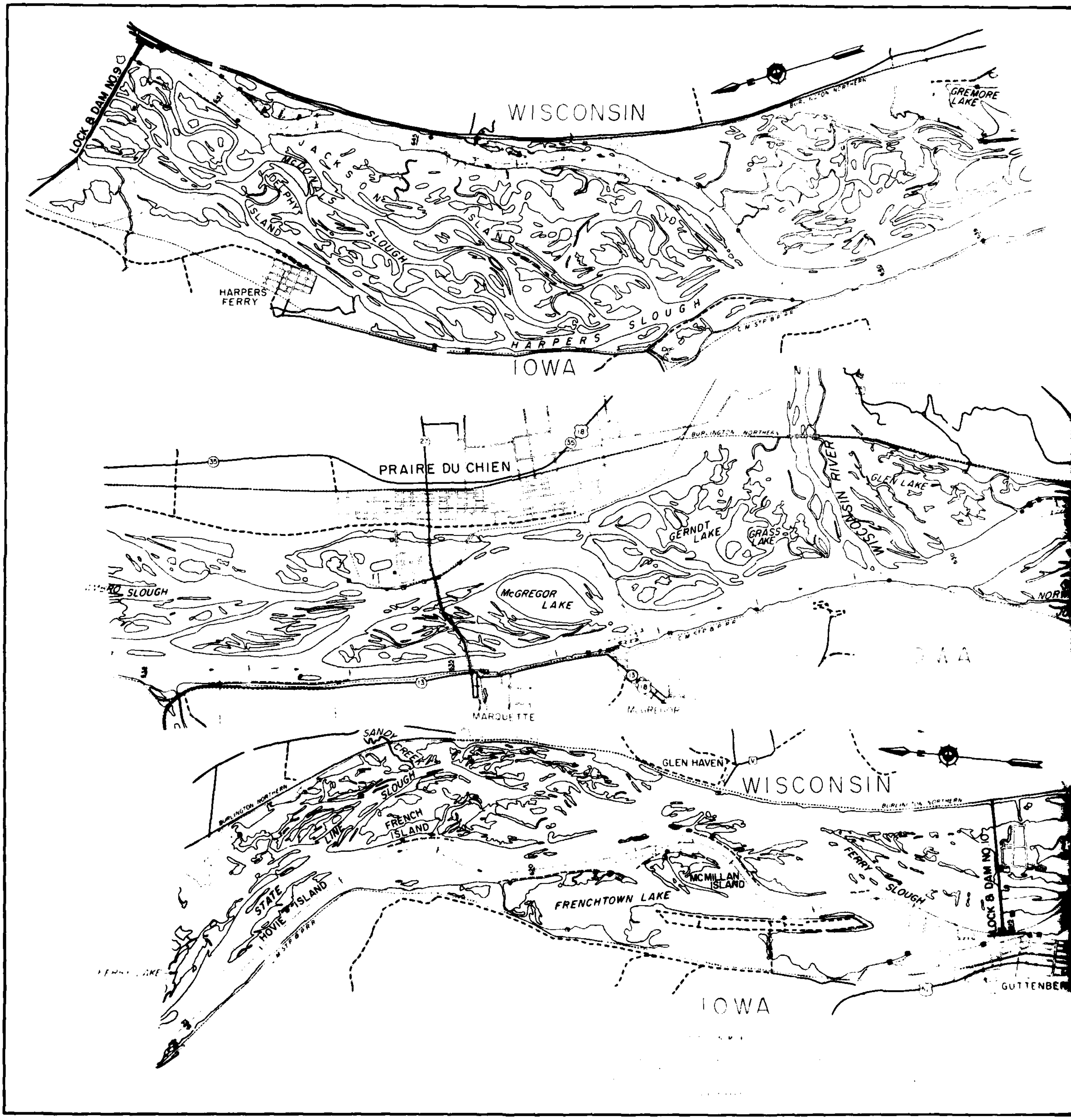


WISCONSIN
GENOA
LOCK & DAM NO. 8
BAD AXE RIVER
VICTORY
BATTLE ISLAN
PICKERAL SLOUGH
RUNNING SLOUGH
MINNESOTA SLOUGH
MINNESOTA
RENO
CROOKED CREEK
MINNESOTA SLOUGH
PICKERAL SLOUGH
ICE HAUL SLOUGH
SLOUGH
UPPER IOWA RIVER
DUCK LAKE
WINNEBAGO CREEK
MINNESOTA
IOWA
NEW ALBIN
MINNESOTA
WINNESHIEK SLOUGH
RUSH CREEK
BIG LAKE
NOTE·
DREDGE CUT AND SPOIL AREAS SHOWN ARE FOR YEARS OF DETAILED RECORDS (1956 – 1972). FREQUENCY OF DREDGE ACTIVITY IS NOT SHOWN.
WINNESHIEK SLOUGH
WISCONSIN
LYNXVILLE
BURLINGTON NORTHERN
LANSING
CLEAR CREEK
LAFAYETTE SLOUGH
VILLAGE CREEK
LOCK & DAM NO 9
HARPERS SLOUGH
IOWA

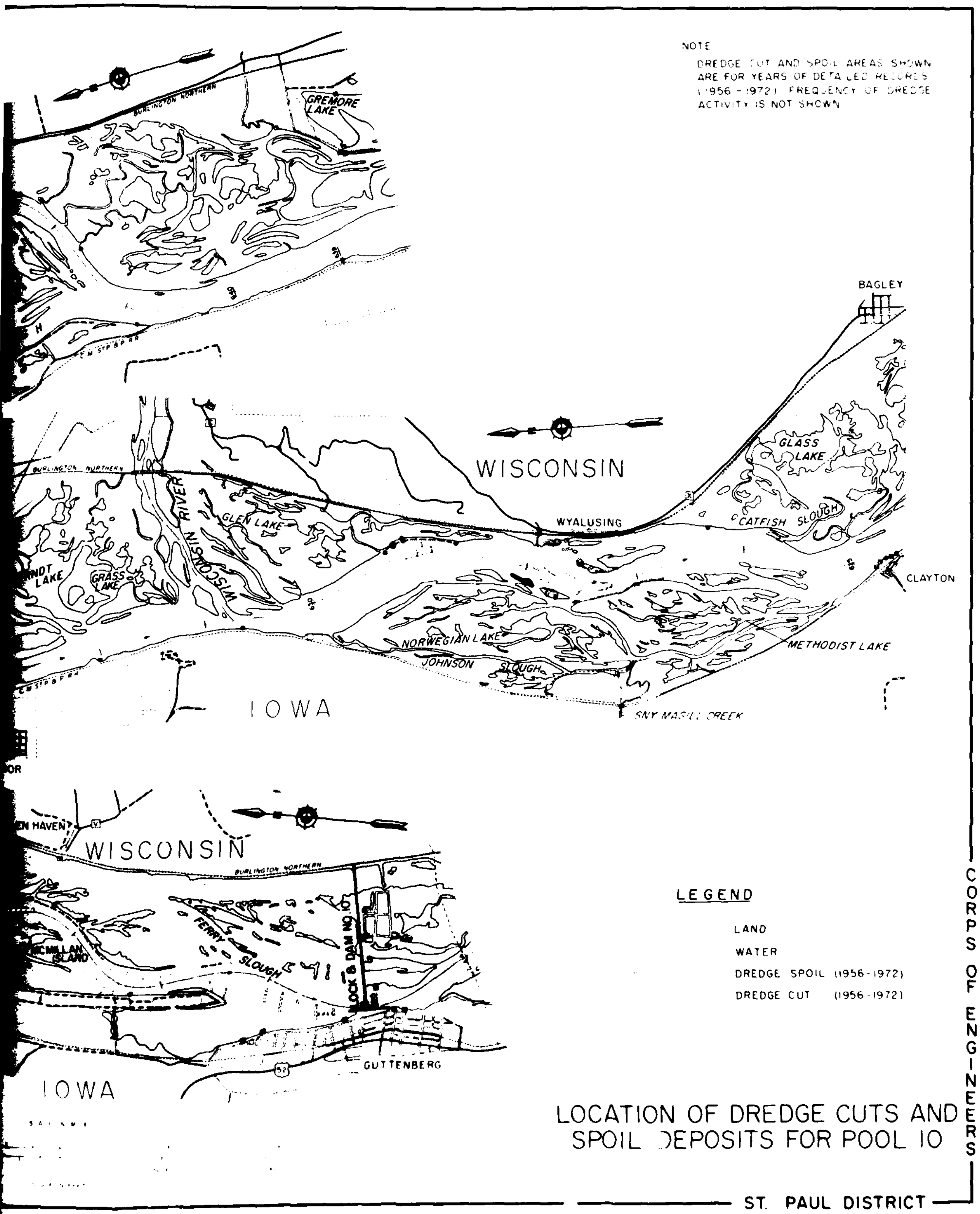
LOCATION OF DREDGE CUTS
AND SPOIL DEPOSITS FOR POOL 9

ST. PAUL DISTRICT

EXHIBIT 41



LOCK & DAM NO 9
WISCONSIN
GREMORE LAKE
BURLINGTON NORTHERN
JACKSON ISLAND
DELPHY ISLAND
HARPERS FERRY
HARPERS SLOUGH
IOWA
PRAIRE DU CHIEN
BURLINGTON NORTHERN
WISCONSIN RIVER
GLEN LAKE
GERNDT LAKE
GRASS LAKE
McGREGOR LAKE
MARQUETTE
SANDY CREEK
SLOUGH
GLEN HAVEN
WISCONSIN
BURLINGTON NORTHERN
FRENCH ISLAND
STATE LINE
HOVIE ISLAND
MCMILLAN ISLAND
FRENCHTOWN LAKE
FERRY SLOUGH
LOCK & DAM NO 10
GUTTENBER
IOWA

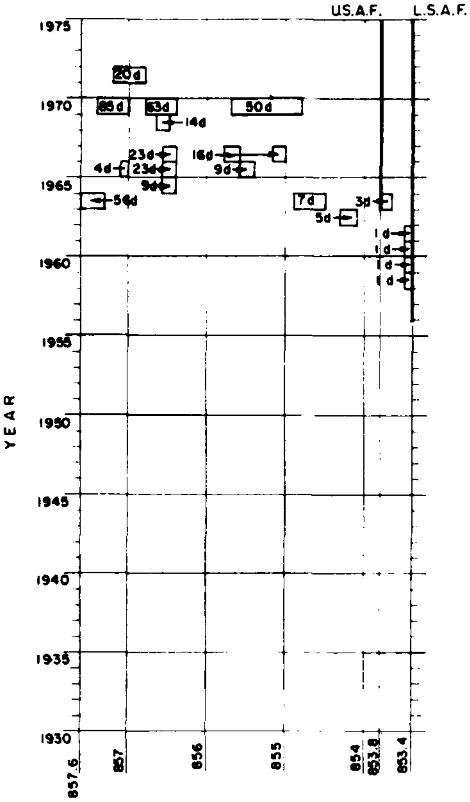


LOCATION OF DREDGE CUTS AND SPOIL DEPOSITS FOR POOL 10

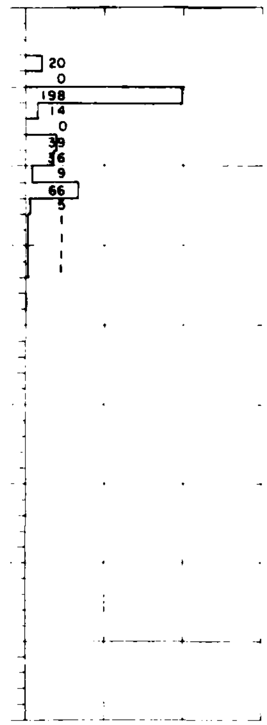
ST. PAUL DISTRICT

EXHIBIT 42

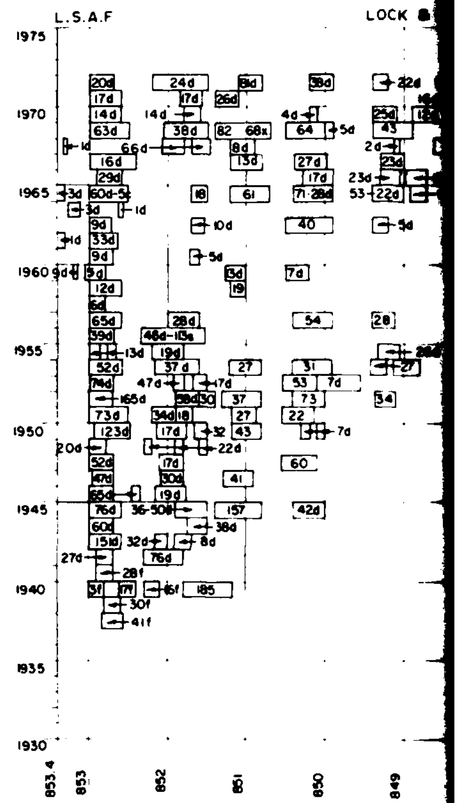
DREDGED VOLUMES AND LOCATIONS



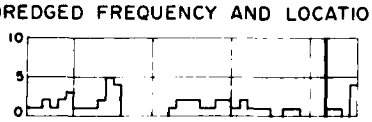
ANNUAL SUMMARY OF DREDGED VOLUMES



DREDGED VOLUMES AND LOCA



DREDGED FREQUENCY AND LOCATION



DREDGED VOLUME SUMMARY BY REACHES

TOTAL / AVERAGE ANNUAL

1964–1972	297/33	0/0	82/9.1	0/0	3/.3	382/42.4
1957–1963	0/0	0/0	0/0	5/.7	4/.6	9/1.3
	856.4	855.8	854.3	853.8	853.4	

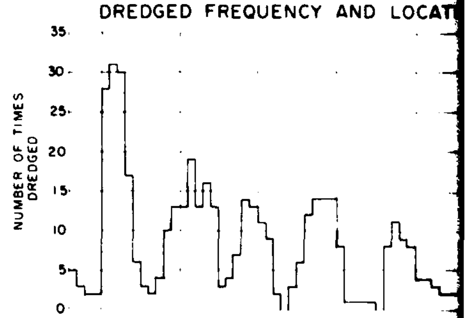
LEGEND

12e — VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON)

DREDGE CODES

CODE	DREDGE	
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A. KERTZMAN (CONTRACTOR)	HYDRAULIC

DREDGED FREQUENCY AND LOCAT



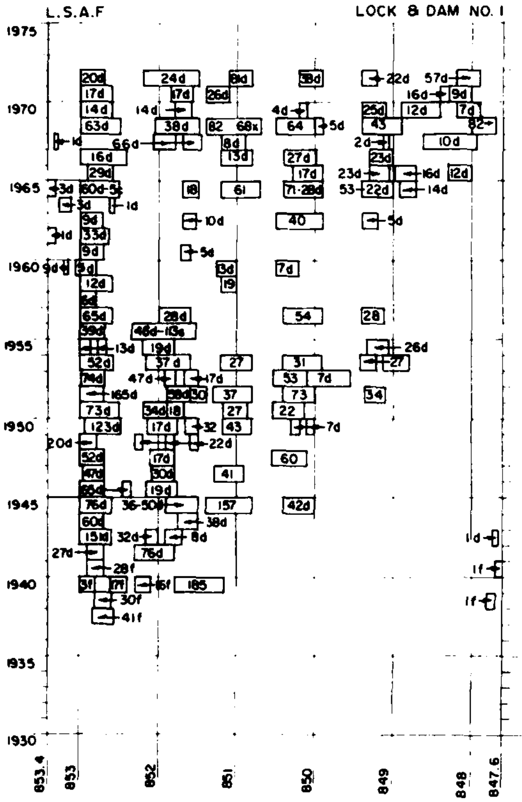
DREDGED VOLUME SUMMARY BY R

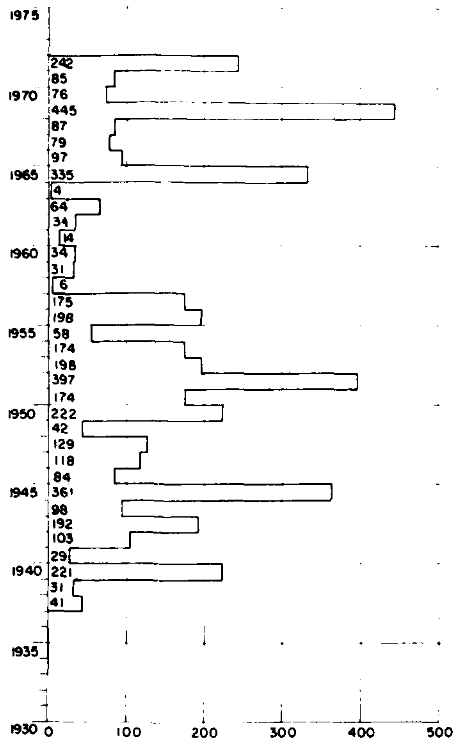
TOTAL / AVERAGE ANNUAL

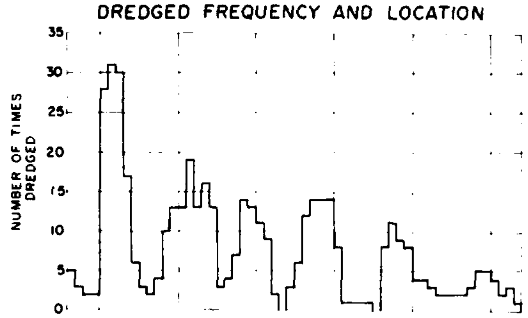
1957–1972	18/1.1	363/227	220/13.8	371/23.2	355/22.2	284/17.8
1938–1956	0/0	1156/60.8	942/49.6	387/20.4	295/15.5	87/4.6
1938–1972	18.5	1519/43.4	1162/33.2	758/21.7	650/18.6	371/10.6
	853	852.4	851.4	850.6	849.5	

OF D

VOL DREDGED (1000 cy)







DREDGED VOLUME SUMMARY BY REACHES

1957 – 1972	18/1.1	363/227	220/13.8	371/23.2	355/22.2	284/17.8	197/12.3	1808/113
1938 – 1956	0/0	1156/60.8	942/49.6	387/20.4	295/15.5	87/4.6	3/0.2	2870/151.1
1938 – 1972	18.5	1519/43.4	1162/33.2	758/21.7	650/18.6	371/10.6	200/5.7	4678/433.7

853 852.4 851.4 850.6 849.5 848.6

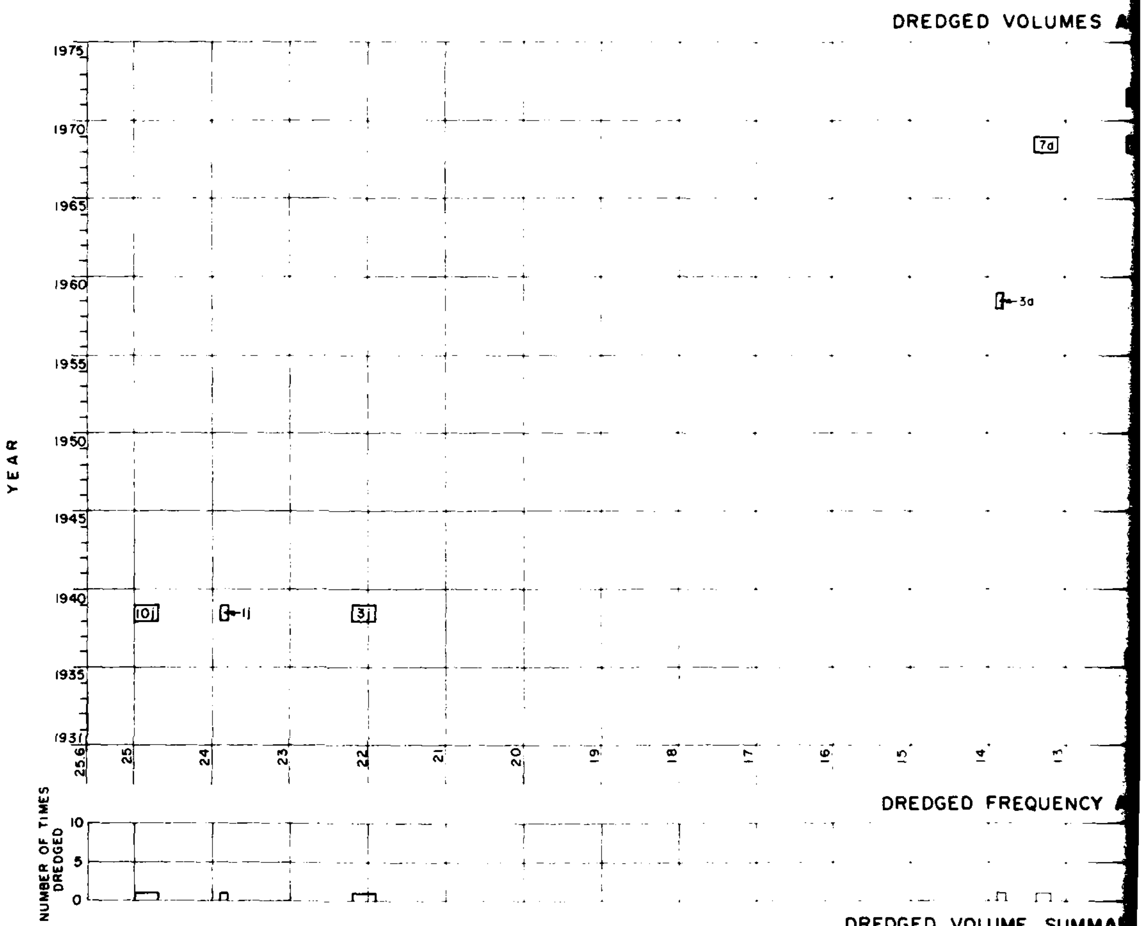
HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN THE UPPER ST. ANTHONY FALLS POOLS AND POOL 1

VOL DREDGED (1000 cy)

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 43



DREDGED VOLUME SUMMA

TOTAL / AVERAGE ANNUAL

1956-1972	0/0	0/0
1936-1955	14/0.7	0/0
1936-1972	14/0.4	0/0

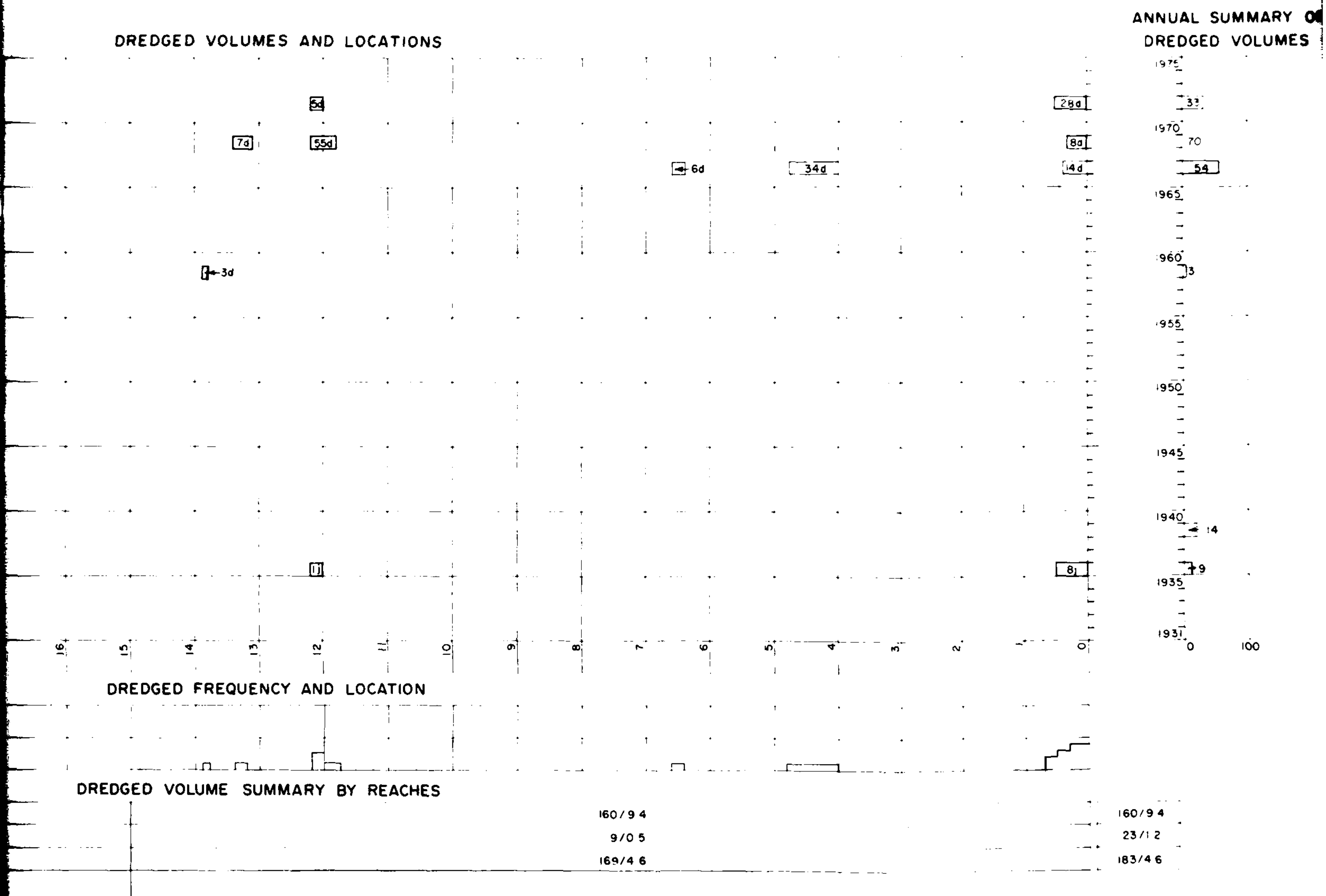
LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON.)

DREDGE CODES

CODE	DREDGE	
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE

CODE	DREDGE	
m	LA CROSSE	HYDRAU
n	DUNDEE	HYDRAU
p	PELEE	HYDRAU
r	ROCK ISLAND	HYDRAU
s	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAU
v	VESUVIUS	HYDRAU
x	A KERTZMAN (CONTRACTOR)	HYDRAU

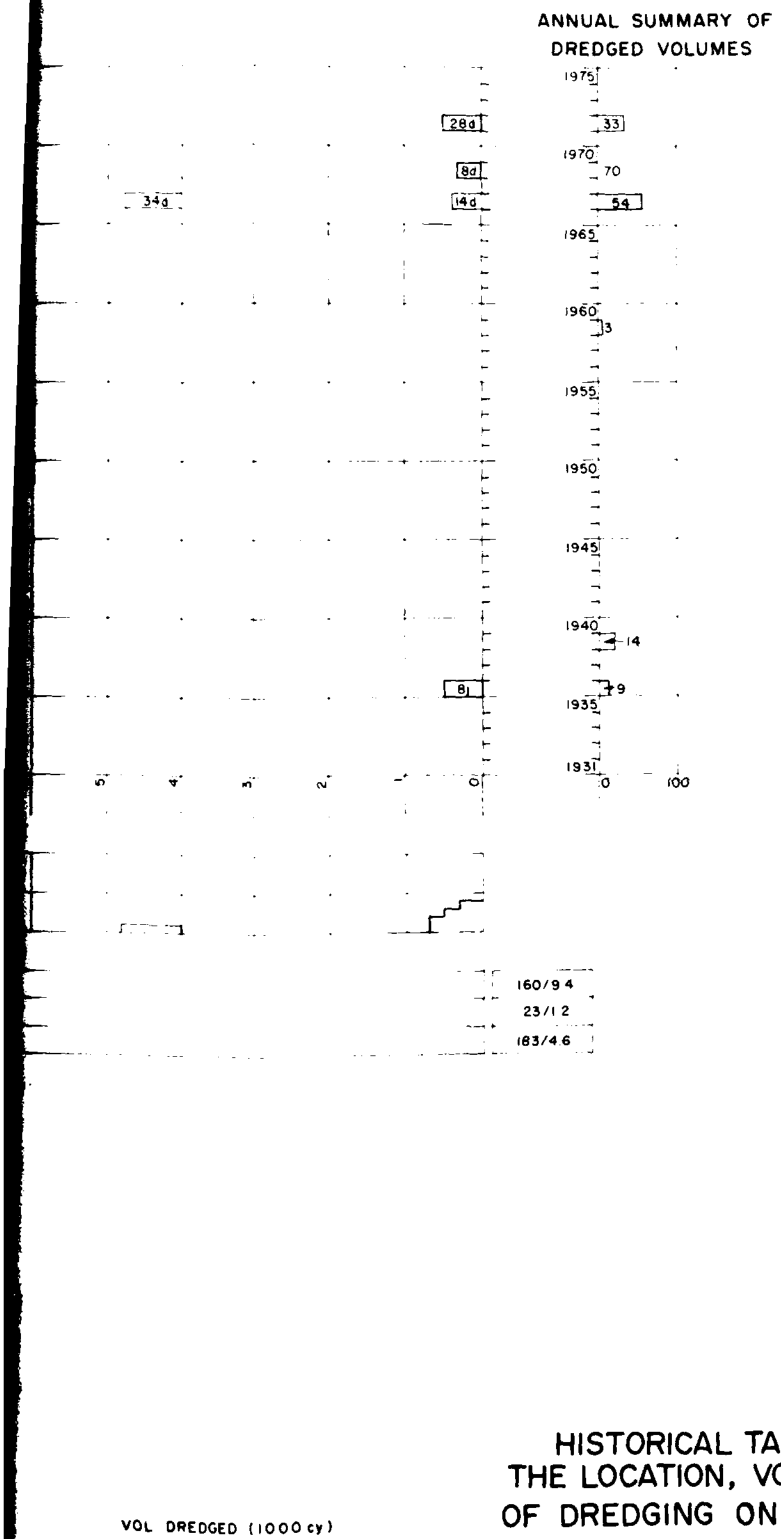


DREDGE

A CROSSE — HYDRAULIC
INDEE — HYDRAULIC
ELEE — HYDRAULIC
OCK ISLAND — HYDRAULIC
IPPER DREDGE ST PAUL (CONTRACT) — DIPPER
AL — HYDRAULIC DUST PAN
ESUVIUS — HYDRAULIC
. KERTZMAN (CONTRACTOR) — HYDRAULIC

VOL DREDGED (1000 cy)

HISTORICAL T
THE LOCATION,
OF DREDGING O



HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING ON THE MINNESOTA RIVER

CORPS OF ENGINEERS

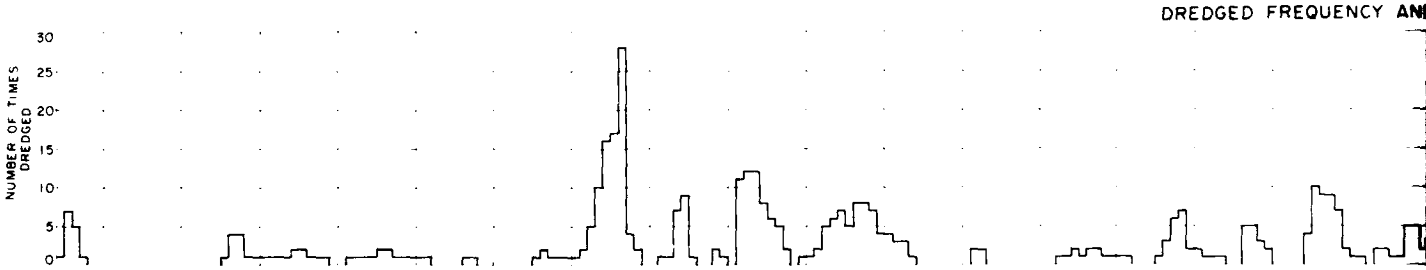
ST. PAUL DISTRICT

EXHIBIT 44

LOCK & DAM NO 1

DREDGED VOLUMES AND

DREDGED FREQUENCY AN



DREDGED VOLUME SUMMARY

TOTAL / AVERAGE ANNUAL	847.2	845.5	843.2	841.5	840.1	839.4	838.9	838.2	836.6	834.8	832.4	830.8	
1956-1972	[illegible]	0/0	188/11	0/0	222/13.1	88/5.2	3/2	42/2.5	1274/74.9	0/0	34/2	[illegible]/4.2	39/2.
1937-1955	48/2.5	0/0	29/1.5	75/3.9	768/40.4	50/2.6	1/1	601/31.6	150/7.9	13/7	458/24	445/23.4	94/4.
1937-1972	49/1.4	0/0	217/6.1	75/2.1	990/27.5	138/3.8	4/1	643/17.9	1424/39.6	13/4	492/3.7	516/14.3	133/3.

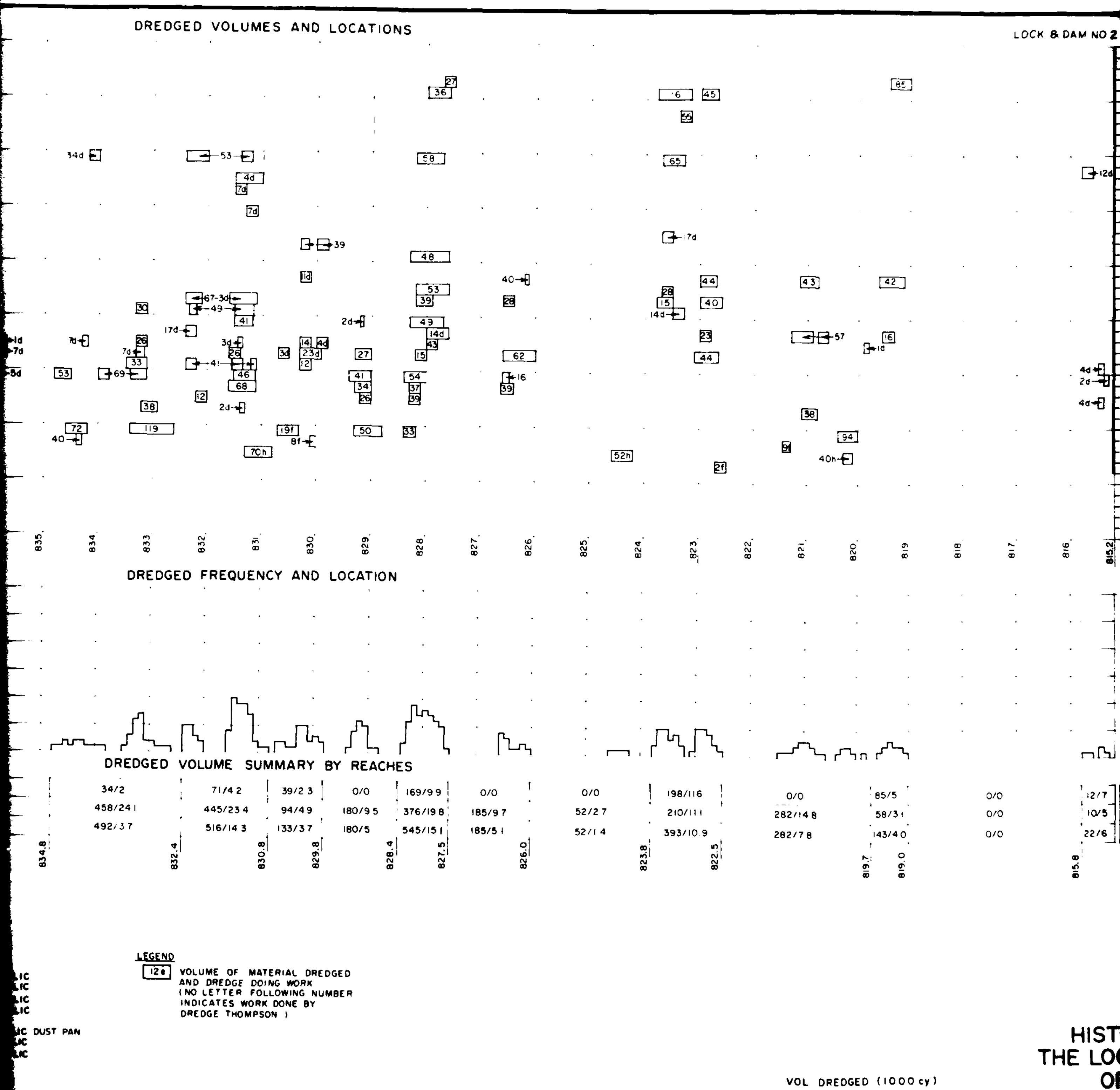
DREDGE CODES

CODE	DREDGE	
d	[illegible]	CLAM SHELL
e	[illegible]	HYDRAULIC
	[illegible]	CLAM SHELL
	[illegible]	[illegible]
f	[illegible]	CLAM SHELL
g	[illegible]	HYDRAULIC
h	[illegible]	HYDRAULIC
	[illegible]	CLAM SHELL
	[illegible]	[illegible] DUST PAN
	[illegible]	[illegible]

CODE	DREDGE	
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A KERTZMAN (CONTRACTOR)	HYDRAULIC

LEGEND

12e VOLUME OF MATERIAL AND DREDGE DOING WO (NO LETTER FOLLOWING INDICATES WORK DONE DREDGE THOMPSON)

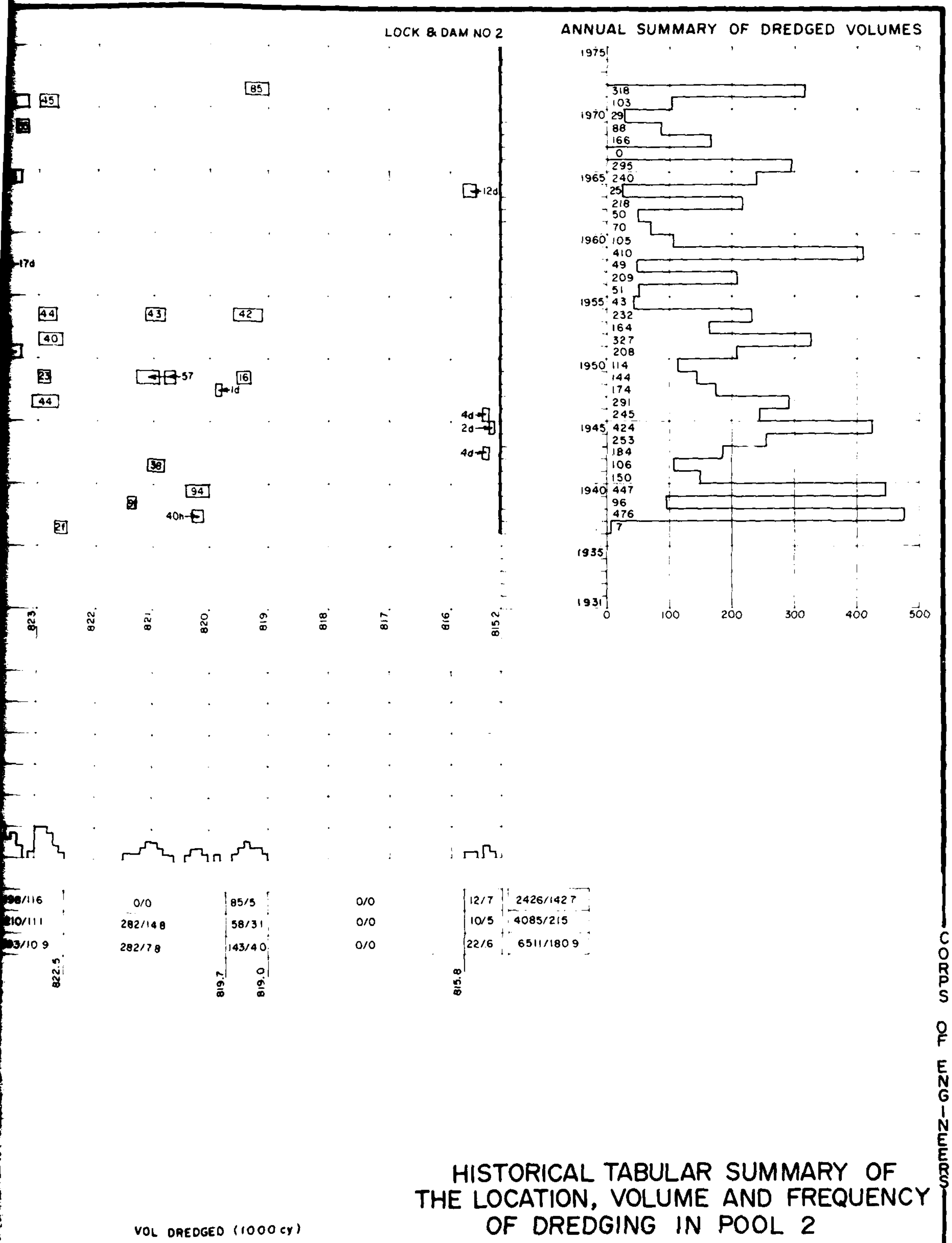


LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON)

LIC
LIC
LIC
LIC
LIC DUST PAN
LIC
LIC

HIST
THE LO
OF

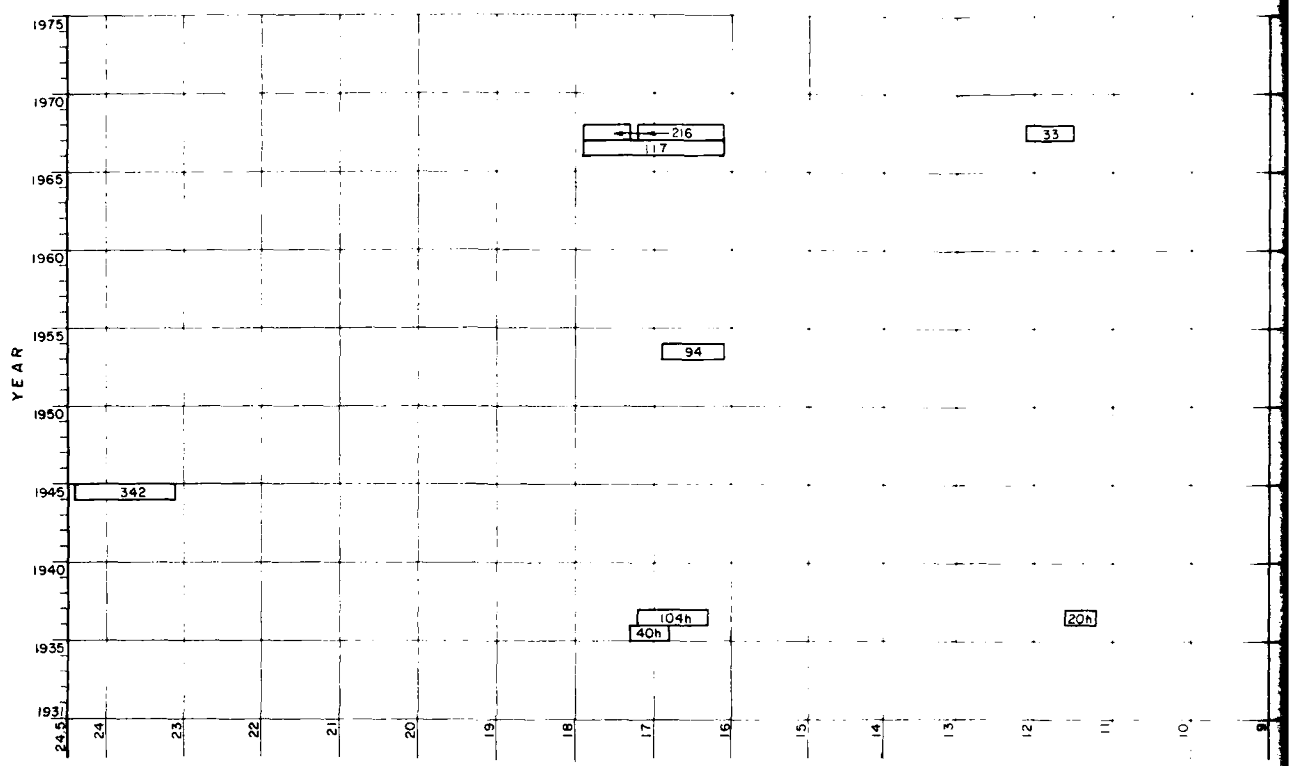


HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN POOL 2

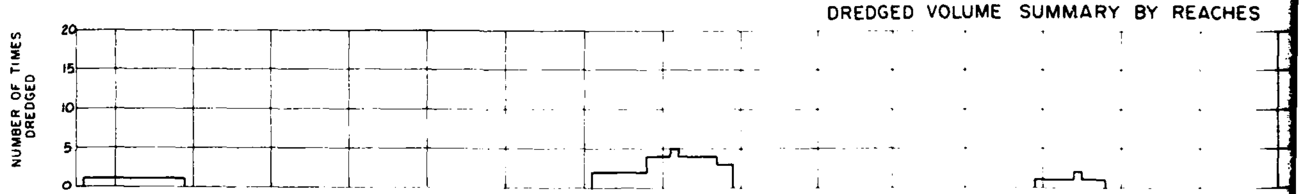
ST. PAUL DISTRICT

EXHIBIT 45

DREDGED VOLUMES AND LOCATIONS



DREDGED VOLUME SUMMARY BY REACHES

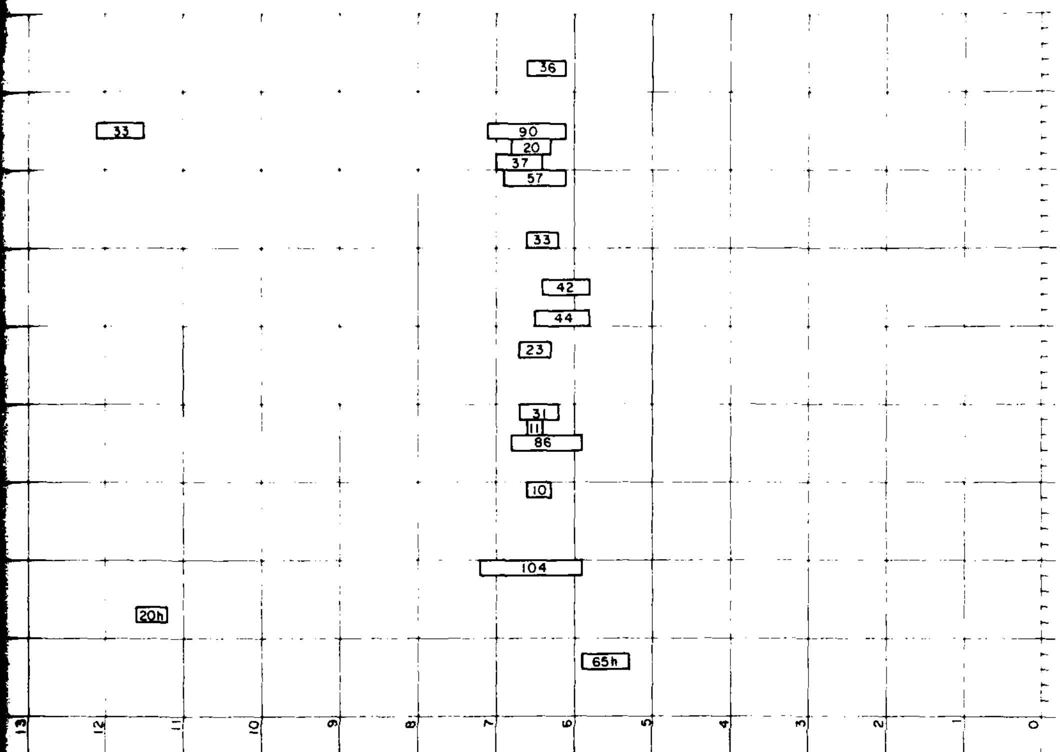


DREDGED FREQUENCY AND LOCATION

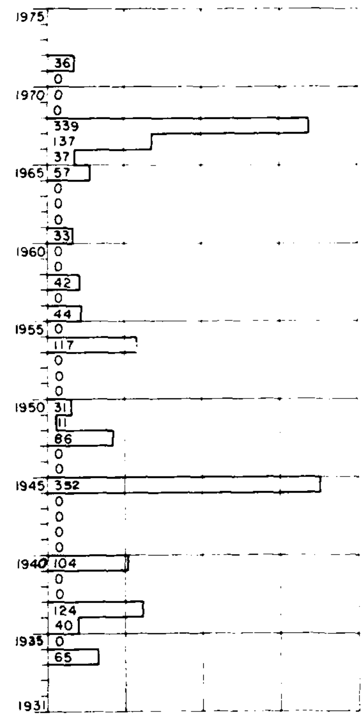
TOTAL/AVERAGE ANNUAL	24.5–22	22–19	19–16	16–12.8	12.8–11	11–9
1956-1972	0/0	0/0	333/19.6	0/0	33/1.9	0/0
1938-1955	342/19.0	0/0	94/5.2	0/0	0/0	0/0
1938-1972	342/9.8	0/0	427/12.2	0/0	33/0.9	0/0
1934-1937	0/0	0/0	144/36.0	0/0	20/5.0	0/0

22 19 16 12.8 11

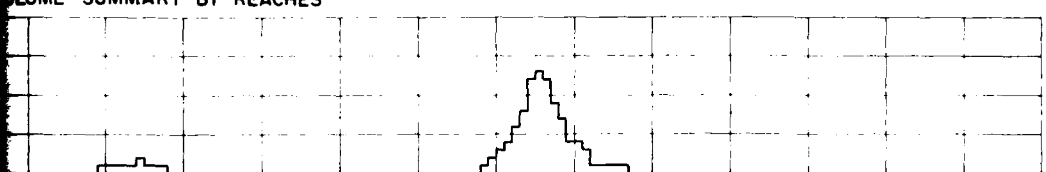
VOLUMES AND LOCATIONS



ANNUAL SUMMARY OF DREDGED VOLUMES



LUME SUMMARY BY REACHES



FREQUENCY AND LOCATION

33/1.9	0/0	359/21.1	0/0		725/42.6
0/0	0/0	265/14.7	0/0		701/38.9
33/0.9	0/0	624/17.8	0/0		1426/40.7
20/5.0	0/0	65/16.3	0/0		229/57.3
12.8	11	7.6	5		

LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON)

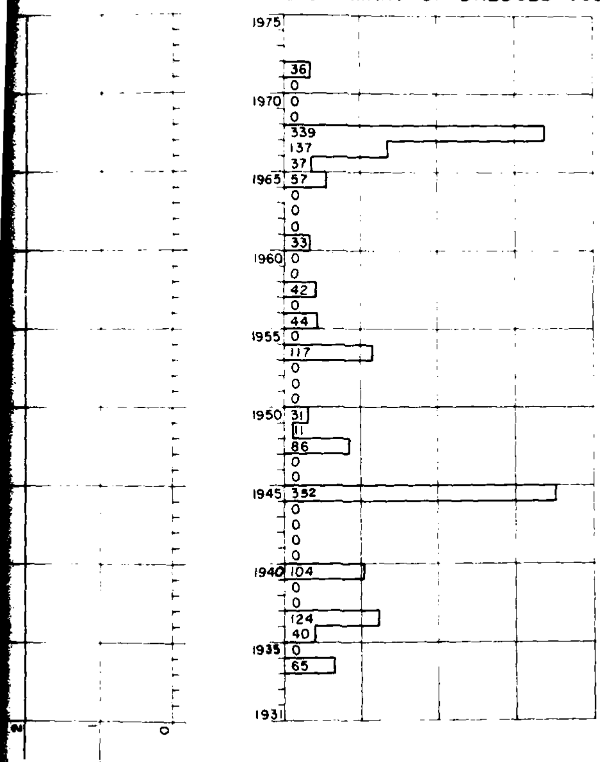
DREDGE CODES

CODE	DREDGE
d	DERRICKBARGE HAUSER
a	AMY A (CONTRACT)
c	CRANE BARGE 771
e	BEAVER (CONTRACT)
f	DERRICKBOAT 556
g	GEYSER
h	CAHABA
j	DERRICKBOAT 566
k	LA CROSSE 84 (CONTRACT)
l	SEIMS HELMER DRAGLINE (CONT
m	LA CROSSE
n	DUNDEE
p	PELEE
r	ROCK ISLAND
s	DIPPER DREDGE ST PAUL (CONTRA
t	TAAL
v	VESUVIUS
x	A KERTZMAN (CONTRACTOR)

HISTORICAL
THE LOCATION,
ON TH

VOL DREDGED (1000 cy)

ANNUAL SUMMARY OF DREDGED VOLUMES



725/42.6
701/38.9
1426/40.7
229/57.3

LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON.)

DREDGE CODES

CODE	DREDGE	NAME
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST. PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A. KERTZMAN (CONTRACTOR)	HYDRAULIC

VOL DREDGED (1000 cy)

HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY ON THE ST. CROIX

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 46

DREDGE CODES

CODE	DREDGE	
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE

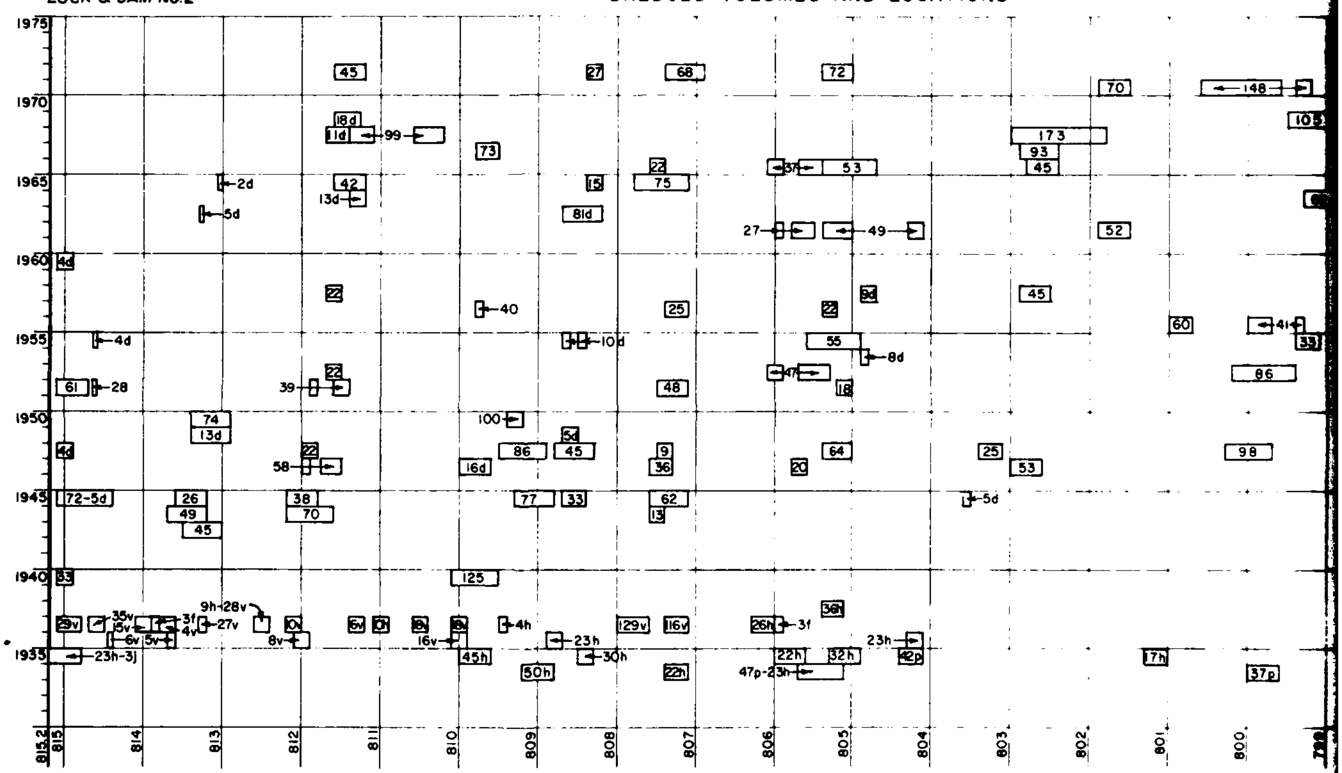
CODE	DREDGE	
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A KERTZMAN (CONTRACTOR)	HYDRAULIC

LEGEND

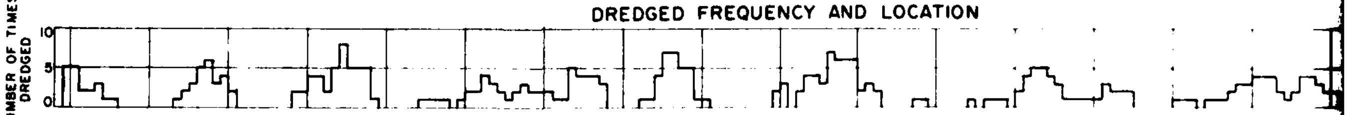
12e VOLU… AND … (NO L… INDIC… DRED…

LOCK & DAM NO.2

DREDGED VOLUMES AND LOCATIONS



DREDGED FREQUENCY AND LOCATION



DREDGED VOLUME SUMMARY BY REACHES

TOTAL/AVERAGE ANNUAL																
1956-1972	4/2	0/0	7/4	0/0	202/11.9	48/2.8	236/13.9	0/0	190/11.2	0/0	253/14.9	16/9	0/0	478/28.1	0/0	422/24.8
1938-1955	207/11.5	0/0	207/11.5	0/0	249/13.8	0/0	497/27.6	0/0	168/9.3	0/0	248/13.8	0/0	30/1.7	53/2.9	0/0	217/12.1
1938-1972	211/6.0	0/0	214/6.1	0/0	451/12.9	48/1.4	733/20.9	0/0	358/10.2	0/0	501/14.3	16/5	30/9	531/15.2	0/0	639/18.3
1934-1937	90/22.5	26/6.5	34/8.5	37/9.3	24/6.0	28/7.0	186/46.5	64/16.1	203/50.8	18/4.5	135/33.8	65/16.3	0/0	0/0	17/4.3	37/9.3
	814.4	813.7	812.9	812.2	811.1	810.1	808.2	807.8	806.9	806.1	804.7	804	803	801.5	801	

VOL DREDGED

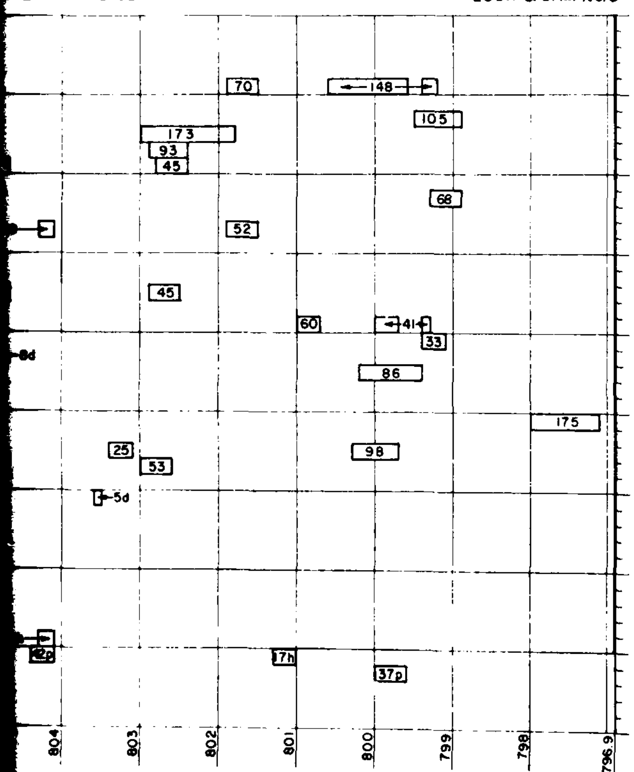
LEGEND

12e	VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON)

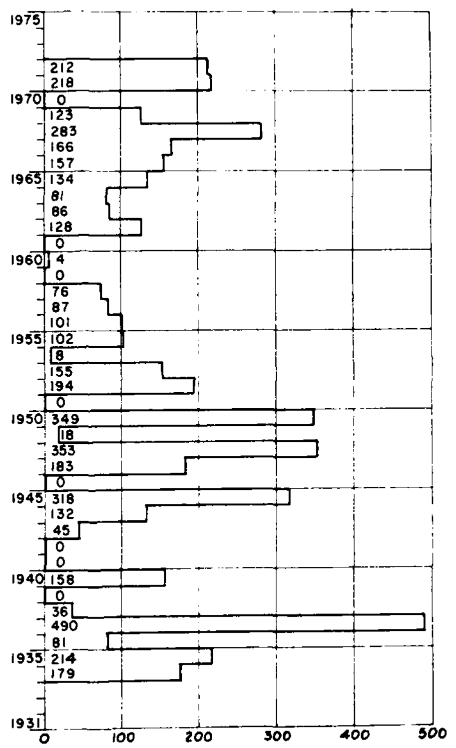
—— HYDRAULIC
—— HYDRAULIC
—— HYDRAULIC
—— HYDRAULIC
RACT) —— DIPPER
—— HYDRAULIC DUST PAN
—— HYDRAULIC
—— HYDRAULIC

LOCATIONS

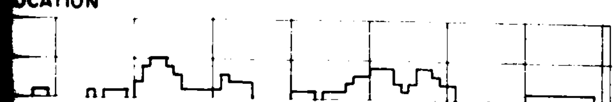
LOCK & DAM NO. 3



ANNUAL SUMMARY OF DREDGED VOLUMES



OCATION



REACHES

V.9	0/0	478/28.1	0/0	422/24.8	0/0	0/0	1856/109.2
V0	30/17	53/2 9	0/0	217/12.1	0/0	175/97	2051/113 9
V.5	30/ 9	531/15.2	0/0	639/18.3	0/0	175/5.0	3907/111.6
V16.3	0/0	0/0	17/43	37/9 3	0/0	0/0	964/241.0

804 803 801.5 801 798.9 798

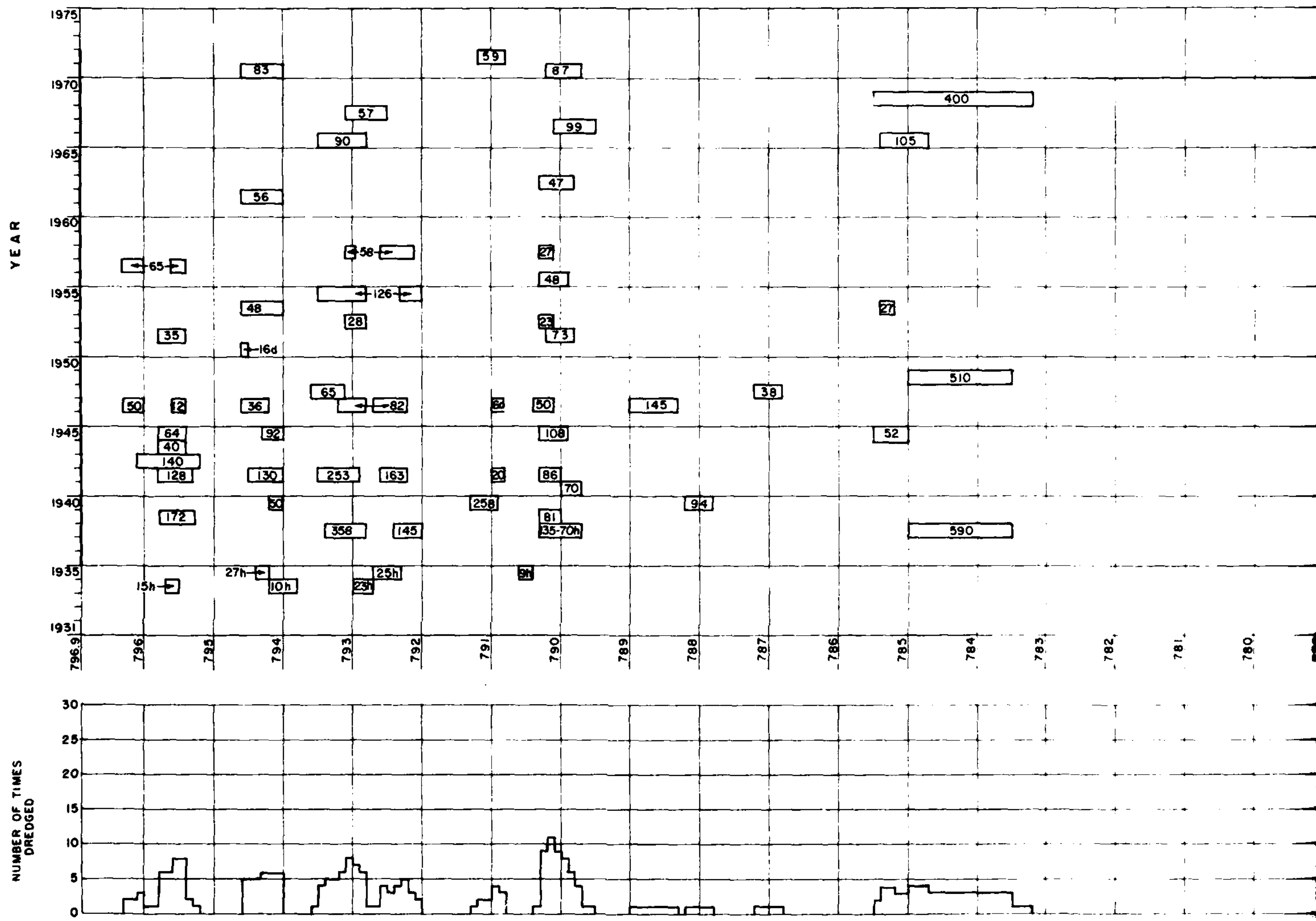
VOL DREDGED (1000 cy)

HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN POOL 3

ST. PAUL DISTRICT
EXHIBIT 47

CORPS OF ENGINEERS

LOCK & DAM NO.3

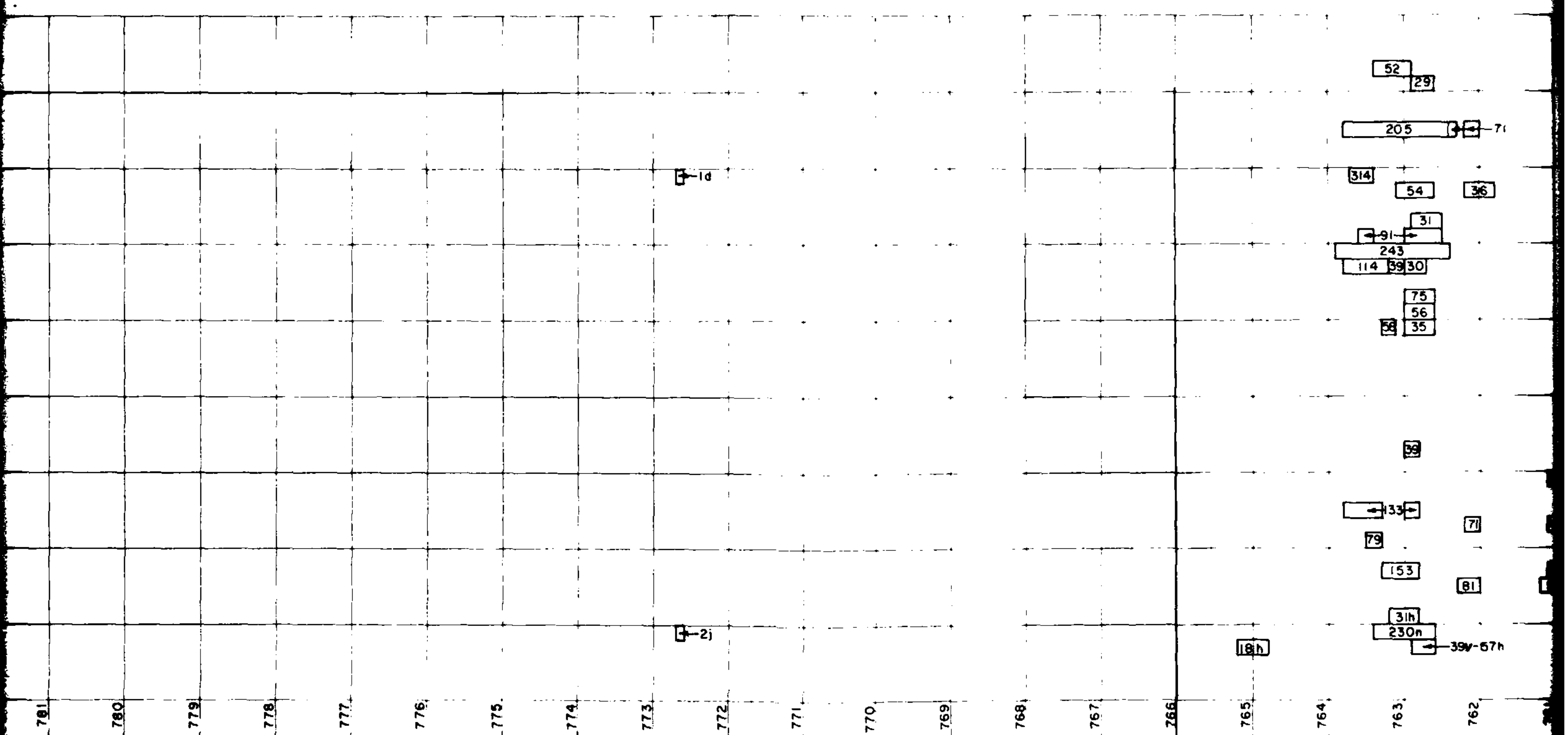


TOTAL / AVERAGE ANNUAL

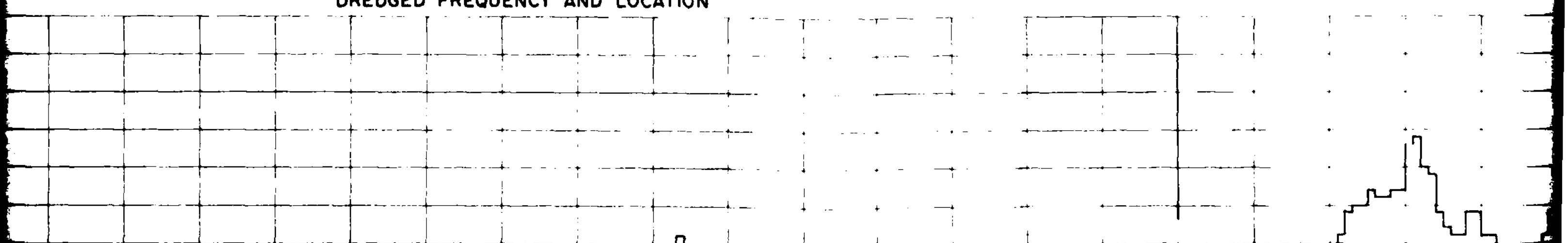
1956-1972	0/0	65/3.8	0/0	139/8.2	205/12.1	0/0	367/21.6	0/0	505/29.7
1936-1955	0/0	641/32.5	0/0	372/18.6	1220/61	0/0	980/49.0	277/13.9	1179/59
1936-1972	0/0	706/19.1	0/0	511/13.8	1425/38.5	0/0	1347/36.4	277/7.5	1684/45.5
1934-1935	0/0	15/7.5	0/0	37/18.5	48/24	0/0	9/4.5	0/0	0/0

796.3 795.2 794.7 794.0 792.0 791.3 789.6 785.5 783.0

DREDGED VOLUMES AND LOCATIONS



DREDGED FREQUENCY AND LOCATION



DREDGED VOLUME SUMMARY BY REACHES

0/0	1/1	0/0	0/0	1440/847
0/0	0/0	0/0	0/0	680/34
0/0	1/.03	0/0	0/0	2120/573
0/0	2/1	0/0	18/9	326/163

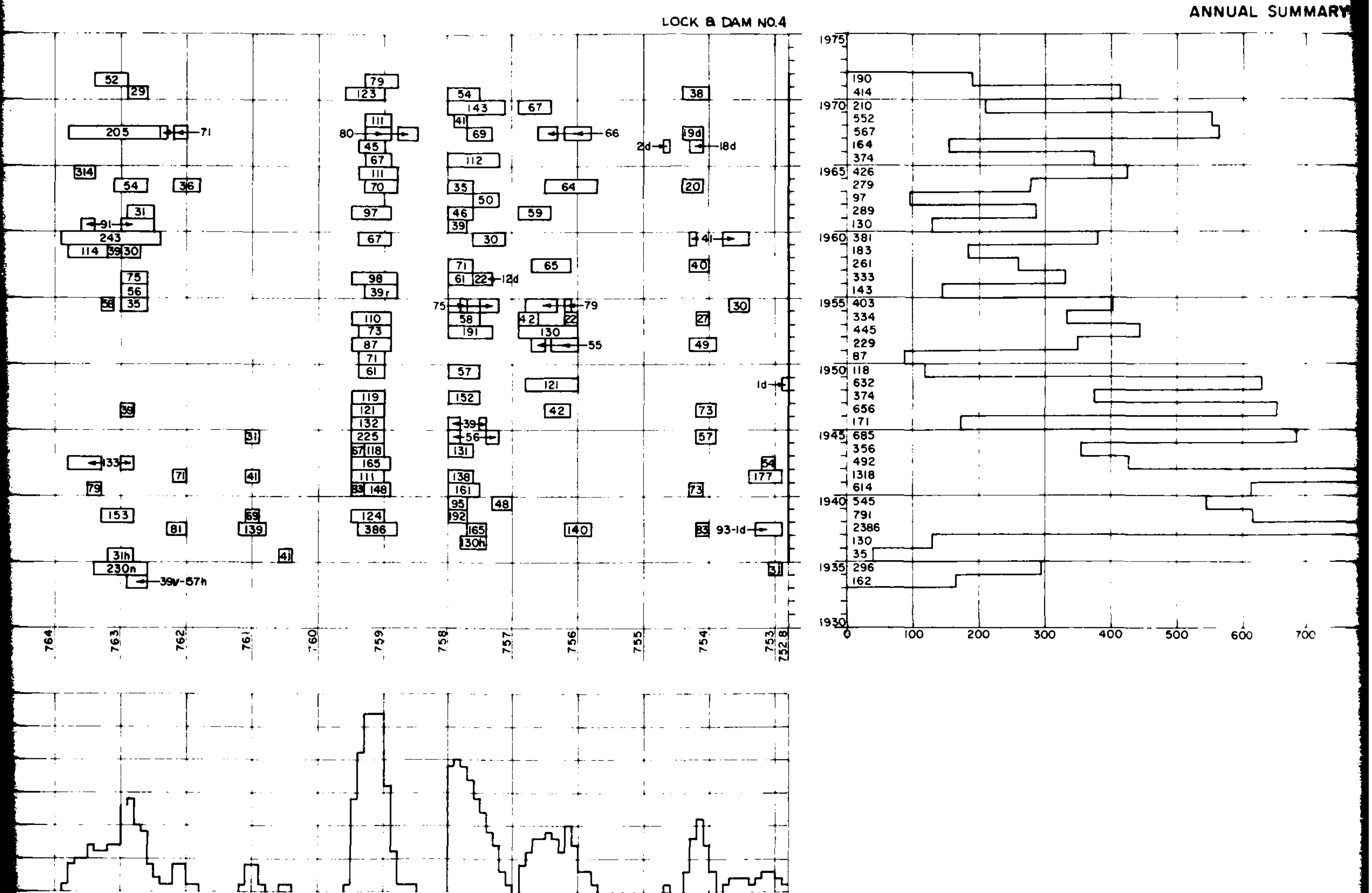
772.9 772.4 765.2 764.0 761.8

DREDGE CODES

CODE	DREDGE	NAME
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE

CODE	DREDGE
m	LA CROSSE
n	DUNDEE
p	PELEE
r	ROCK ISLA
s	DIPPER DR
t	TAAL
v	VESUVIUS
x	A KERTZ

1 2



1440/84.7	0/0	987/58.1	0/0	785/46.2	321/18.9	0/0	178/10.5	0/0	4993/293.7
680/34	284/14.2	2201/110.1	0/0	1688/84.4	631/31.6	0/0	392/19.6	326/16.3	10871/543.6
2120/57.3	284/77	3188/86.2	0/0	2473/66.8	952/25.7	0/0	570/15.4	326/8.8	15864/428.8
326/163	0/0	0/0	0/0	0/0	0/0	0/0	0/0	3/1.5	458/229.0

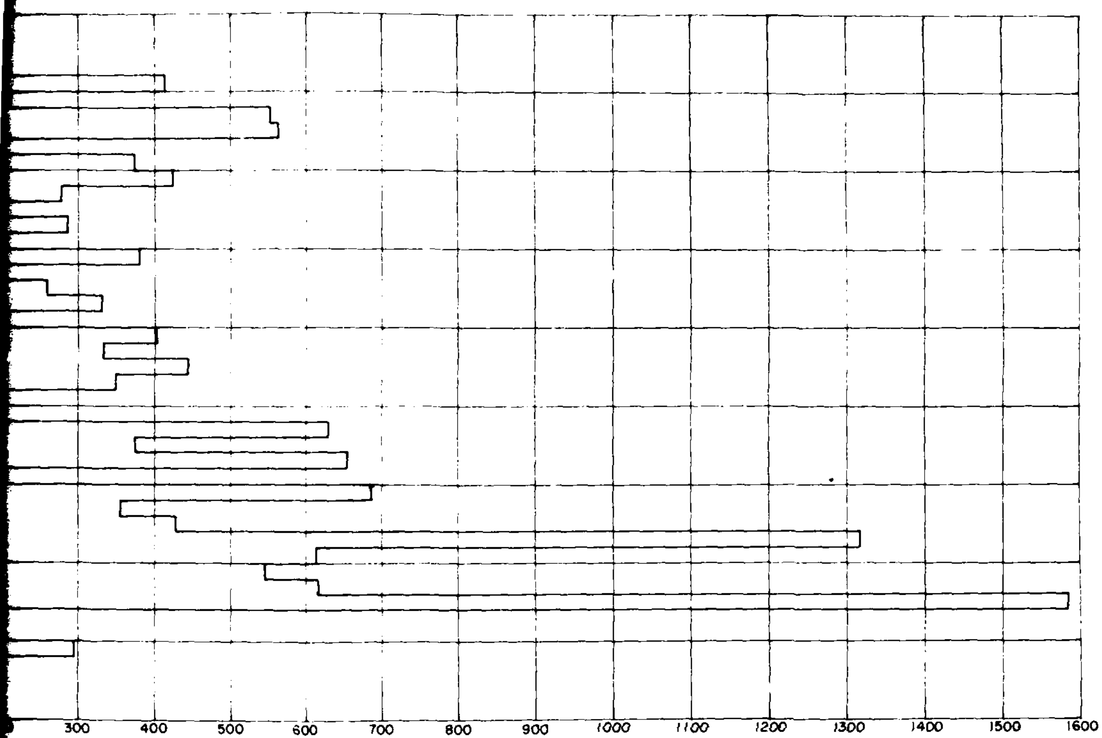
764.0 761.8 759.6 758.5 758.0 757.0 755.7 754.7 753.4

CODE	DREDGE	NAME
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST. PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A. KERTZMAN (CONTRACTOR)	HYDRAULIC

VOL DREDGED (1000 cy)

3

ANNUAL SUMMARY OF DREDGED VOLUMES



LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON.)

CORPS OF ENGINEERS

HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN POOL 4

VOL DREDGED (1000 cy)

ST. PAUL DISTRICT

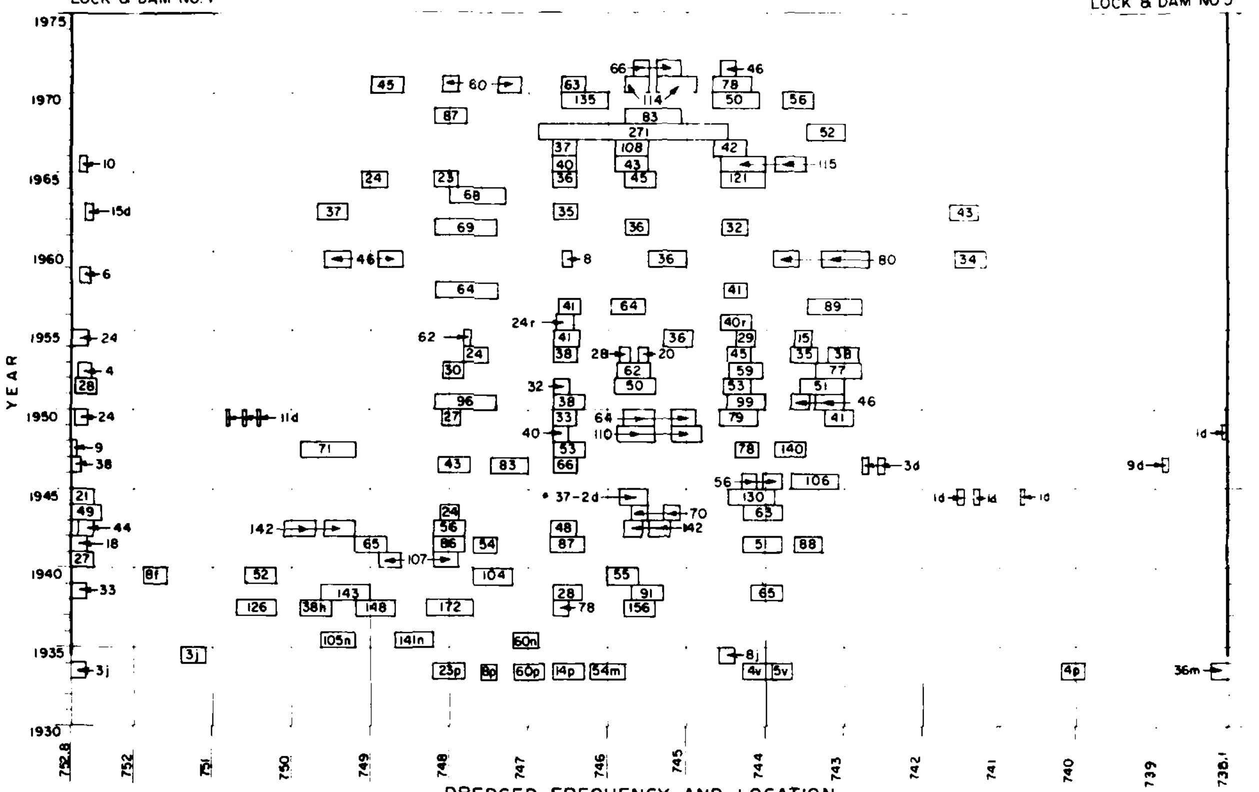
EXHIBIT 48

11

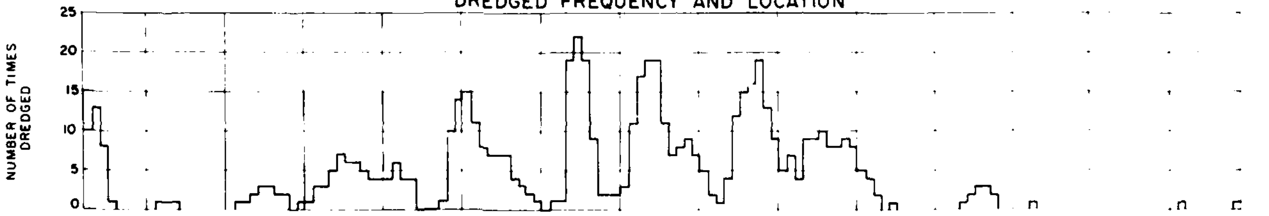
DREDGED VOLUMES AND LOCATIONS

LOCK & DAM NO.4

LOCK & DAM NO 5



DREDGED FREQUENCY AND LOCATION



DREDGED VOLUME SUMMARY BY REACHES

TOTAL / AVERAGE ANNUAL

1957–1972	31/1.9	0/0	63/3.9	89/5.6	371/23.2	485/30.3	736/46	520/33.1	322/20.1	77/4.8	0/0	269
1936–1956	319/15.2	197/9.4	459/21.9	424/20.2	998/47.5	606/28.9	923/44.0	777/37	710/33.8	2/.1	11/0.5	542
1936–1972	350/9.5	197/5.3	522/14.1	513/13.9	1369/37.0	1091/29.5	1659/44.8	1297/35.1	1032/27.9	79/2.1	11/.3	812(
1934–1935	3/1.5	3/1.5	0/0	0/0	61/30.5	73/36.5	25/12.5	12/6	5/2.5	0/0	40/20	222

752 750.2 749.2 748.3 746.9 746 744.7 743.9 742.3 741

DREDGE CODES

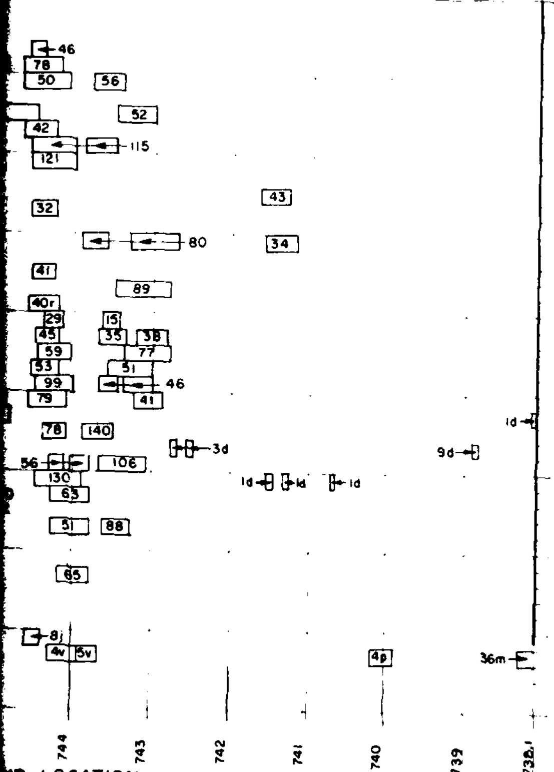
CODE	DREDGE	
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE

CODE	DREDGE	
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A. KERTZMAN (CONTRACTOR)	HYDRAULIC

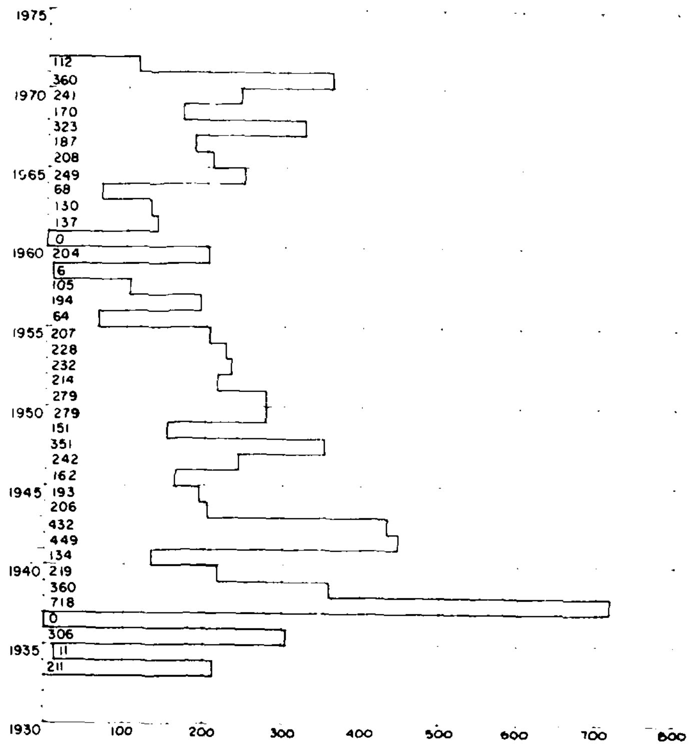
VOL DREDGED (1000 cy)

D LOCATIONS

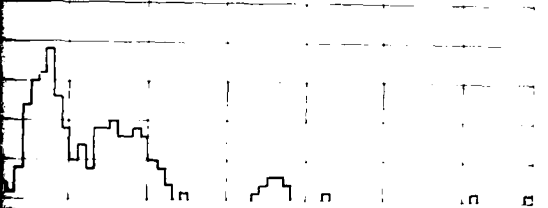
LOCK & DAM NO 5



ANNUAL SUMMARY OF DREDGED VOLUMES



D LOCATION



RY BY REACHES

520/33.1	322/20.1	77/4.8	0/0	2694/168.4
777/37	710/33.8	2/.1	11/0.5	5426/258.4
1297/35.1	1032/27.9	79/2.1	11/.3	8120/219.5
12/6	5/2.5	0/0	40/20	222/111

743.9 742.3 741

LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON)

REDGE

- CROSSE — HYDRAULIC
- DEE — HYDRAULIC
- LEE — HYDRAULIC
- CK ISLAND — HYDRAULIC
- PER DREDGE ST PAUL (CONTRACT) — DIPPER
- AL — HYDRAULIC DUST PAN
- UVIUS — HYDRAULIC
- ERTZMAN (CONTRACTOR) — HYDRAULIC

VOL DREDGED (1000 cy)

HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN POOL 5

CORPS OF ENGINEERS

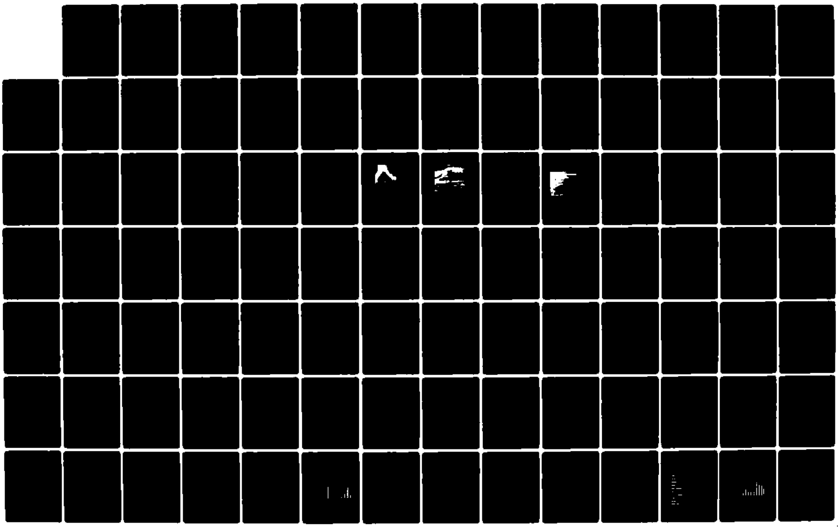
ST. PAUL DISTRICT

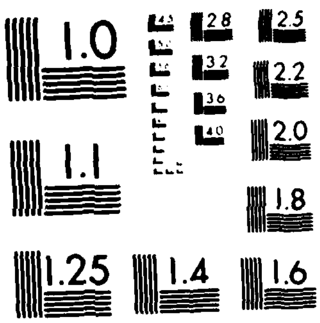
EXHIBIT 49

AD-A133 512 OPERATION AND MAINTENANCE 9-FOOT NAVIGATION CHANNEL UPPER MISSISSIPPI RIV..(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT AUG 74

2/7

UNCLASSIFIED F/G 13/2 NL

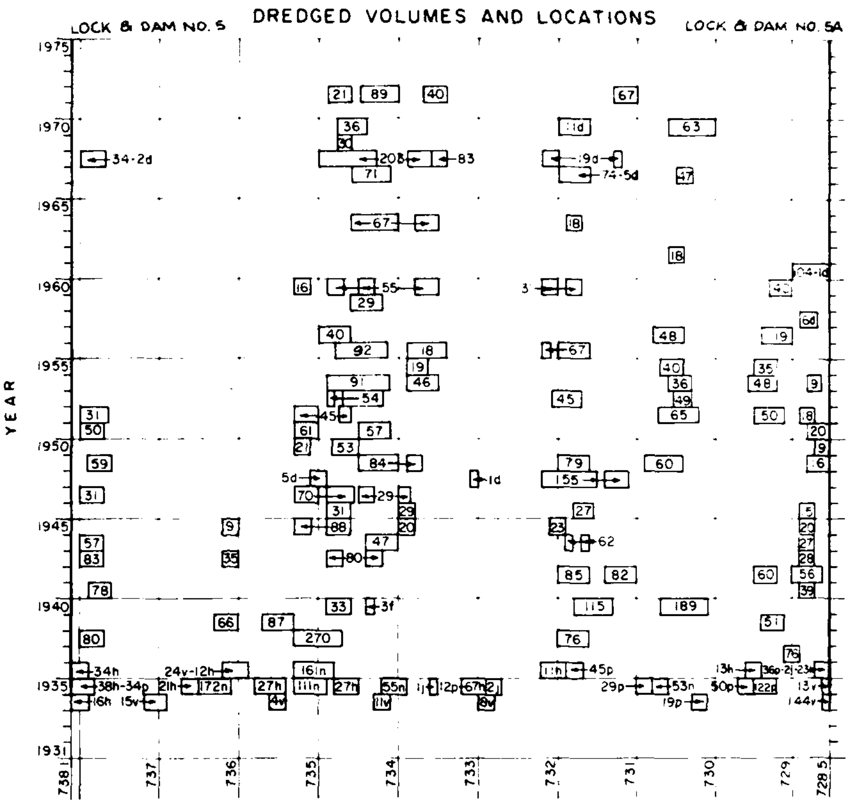


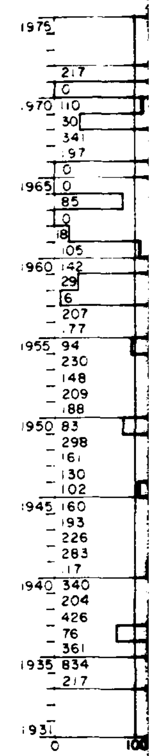


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

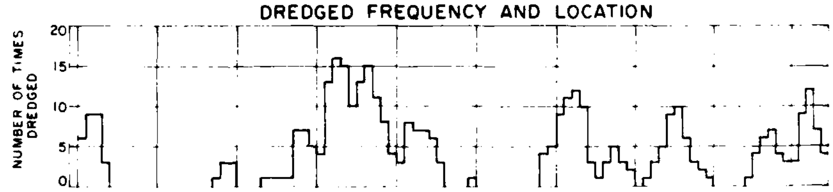
DREDGED VOLUMES AND LOCATIONS

LOCK & DAM NO. 5 — LOCK & DAM NO. 5A





DREDGED FREQUENCY AND LOCATION



DREDGED VOLUME SUMMARY BY REACHES

TOTAL / AVERAGE ANNUAL

1956-1972	36/21	0/0	16/.9	642/37.8	232/13.6	0/0	219/12.9	73/4.3	176/10.4	270/15.9	1664/97.9
1937-1955	469/24.7	110/5.8	393/20.7	781/41.1	149/7.8	1/.1	577/30.4	172/9.1	439/23.1	577/30.4	3668/193.1
1937-1972	505/14.0	110/3.1	409/11.4	1423/39.5	381/10.6	1/.03	796/22.1	245/6.8	615/17.1	847/23.5	5332/148.1
1934-1936	122/40.6	244/81.3	212/70.6	166/55.3	19/6.3	89/29.7	56/18.7	10/3.3	91/30.3	403/134.3	1412/470.6

737.5 735.8 735 734 733.2 732.2 731.5 731 729.7

LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON)

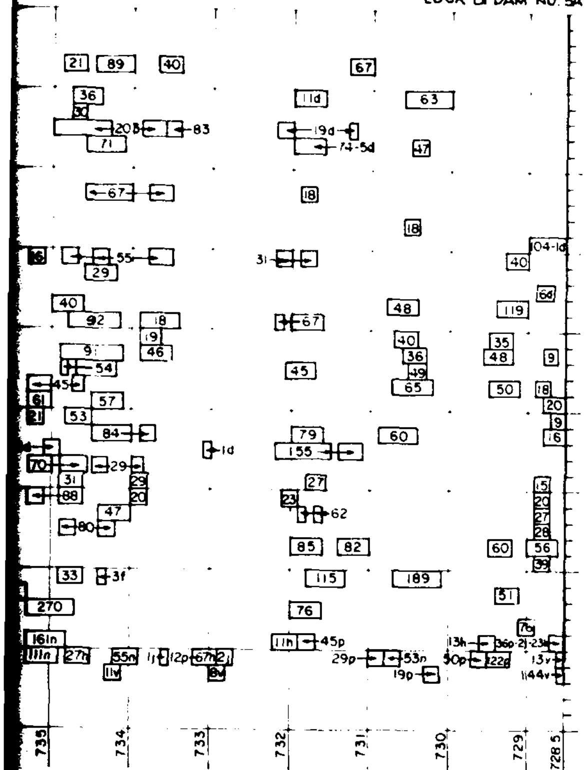
DREDGE CODES

CODE	DREDGE	
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAMABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE

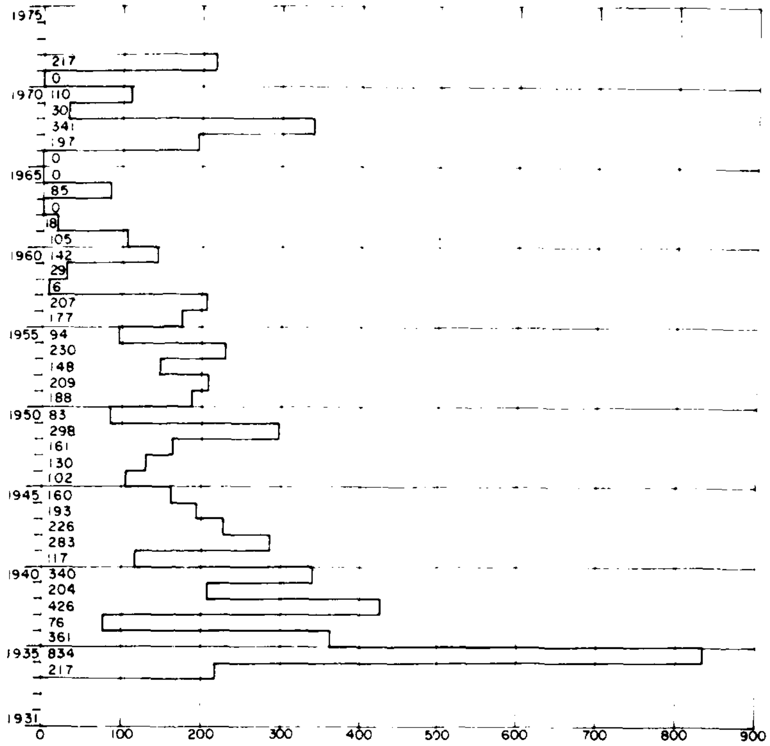
CODE	DREDGE	
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST. PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A. KERTZMAN (CONTRACTOR)	HYDRAULIC

VOL DREDGED (1000 cy)

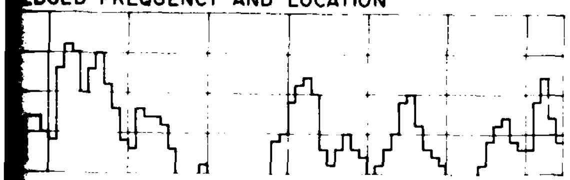
EDGED VOLUMES AND LOCATIONS



ANNUAL SUMMARY OF DREDGED VOLUMES



EDGED FREQUENCY AND LOCATION



ED VOLUME SUMMARY BY REACHES

	642/378	232/13.6	0/0	219/12.9	73/43	176/10.4	270/15.9	1664/979
0.7	781/41.1	149/7.8	1/.1	577/30.4	172/9.1	439/23.1	577/30.4	3668/193.1
.4	1423/39.5	381/10.6	1/.03	796/22.1	245/6.8	615/17.1	847/23.5	5332/148.1
0.6	166/55.3	19/6.3	89/29.7	56/18.7	10/3.3	91/30.3	403/134.3	1412/470.6
735	734	733.2	732.2	731.5	731	729.7		

DREDGE

- LA CROSSE — HYDRAULIC
- DUNDEE — HYDRAULIC
- PELEE — HYDRAULIC
- ROCK ISLAND — HYDRAULIC
- DIPPER DREDGE ST. PAUL (CONTRACT) — DIPPER
- TAAL — HYDRAULIC DUST PAN
- VESUVIUS — HYDRAULIC
- A. KERTZMAN (CONTRACTOR) — HYDRAULIC

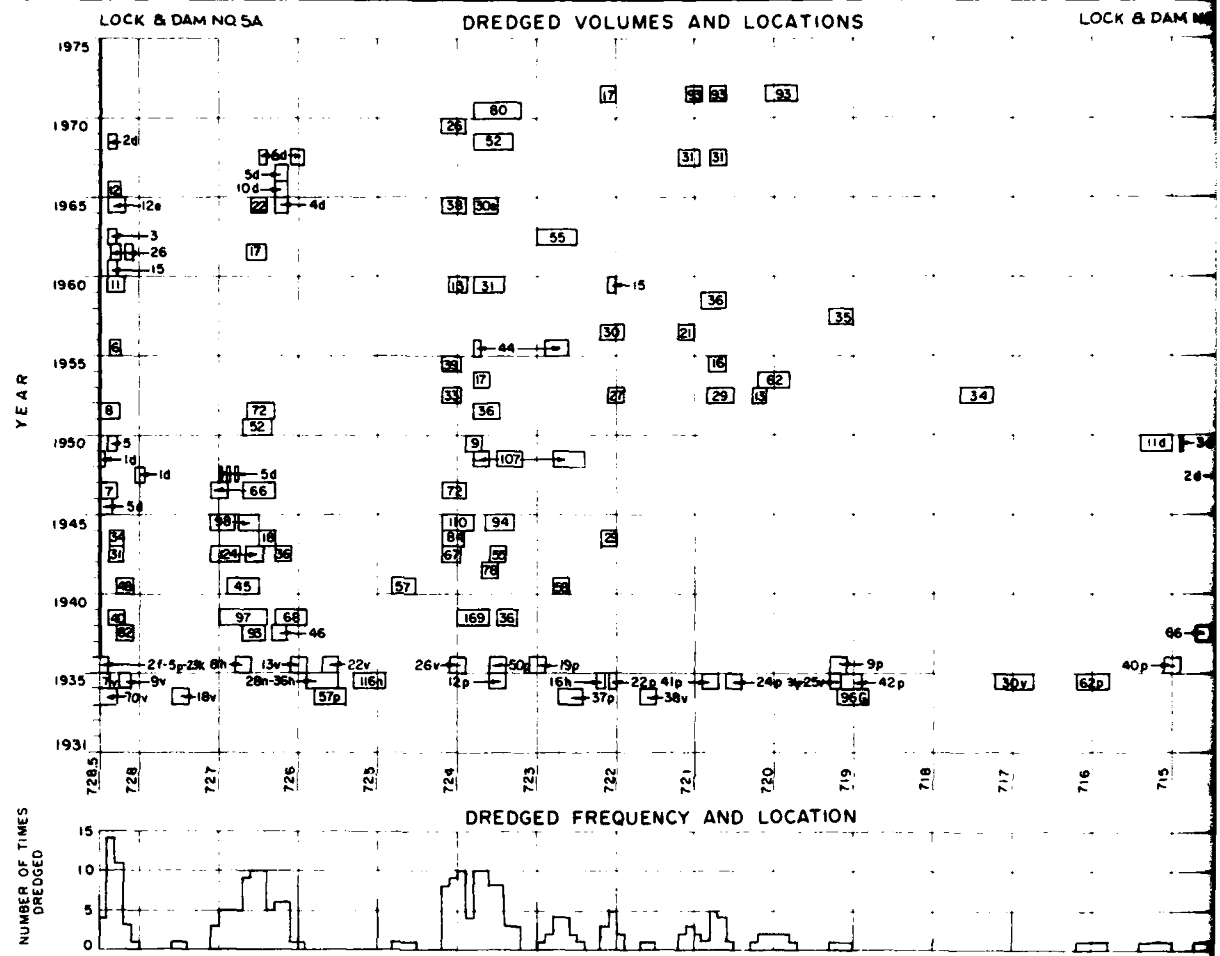
VOL DREDGED (1000 cy)

HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN POOL 5A

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 50



DREDGED VOLUME SUMMARY BY REACHES

TOTAL/AVERAGE ANNUAL

	728.5–727.3	727.3–725.9	725.9–724.4	724.4–723.9	723.9–723.1	723.1–722.3	722.3–721.8	721.8–720.3	720.3–719.4	719.4–718.2	718.2–716.5	716.5–
1956 – 1972	87/5.1	64/3.8	0/0	77/4.5	204/12	88/5.2	62/3.6	131/7.7	50/2.9	35/2.1	0/0	0/0
1937 – 1955	262/13.8	820/43.2	57/3	425/22.4	531/27.9	108/5.7	56/2.9	45/2.4	75/3.9	0/0	34/1.8	82/4.3
1934 – 1936	134/44.7	21/7	259/13.6	26/8.7	62/20.7	56/18.7	38/12.7	103/34.3	0/0	203/67.7	30/10	102/34
1937 – 1972	483/13.4	905/25.1	316/8.8	529/14.7	797/22.1	252/7.0	156/4.3	279/7.76	125/3.5	238/6.7	64/1.8	184/5.1

DREDGE CODES

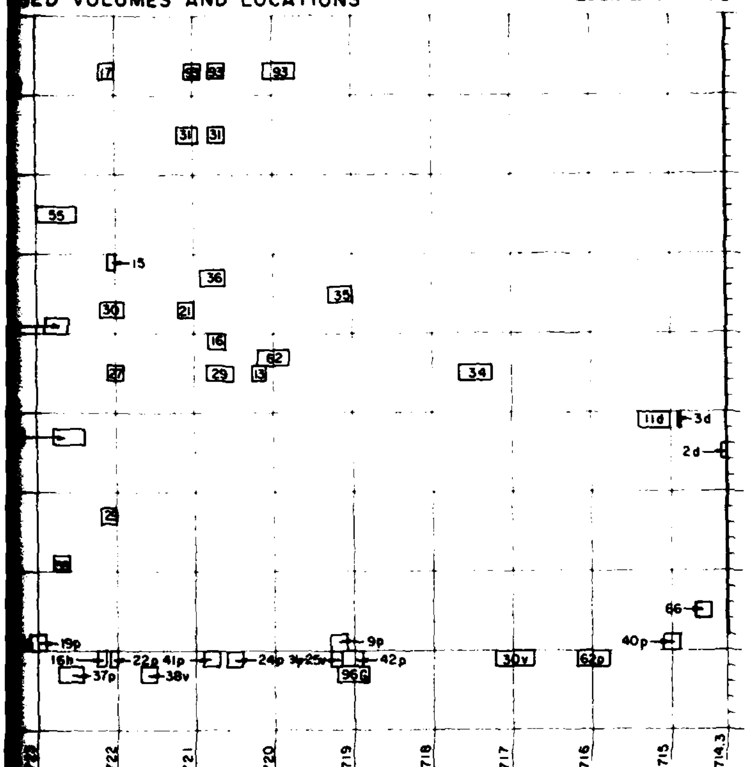
CODE	DREDGE	
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE

CODE	DREDGE	
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A. KERTZMAN (CONTRACTOR)	HYDRAULIC

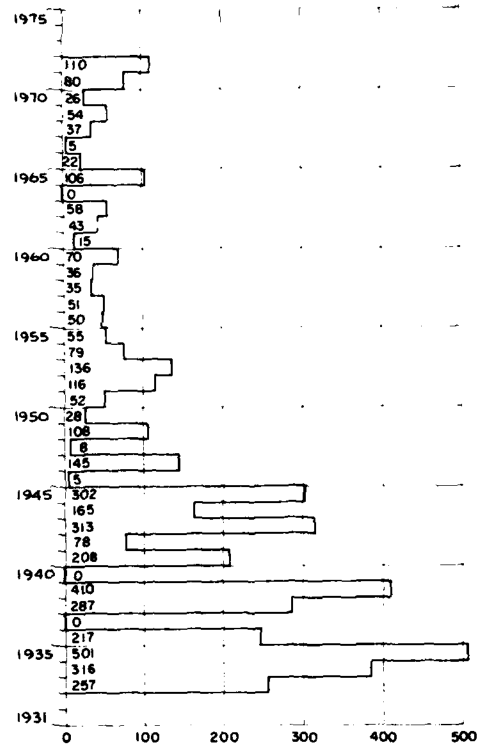
VOL DREDGED (1000 cy)

...ED VOLUMES AND LOCATIONS

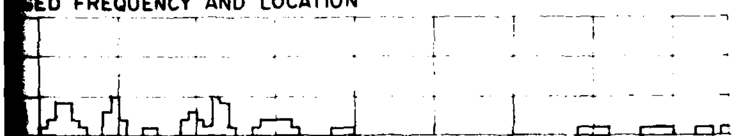
LOCK & DAM NO. 6



ANNUAL SUMMARY OF DREDGED VOLUMES



...ED FREQUENCY AND LOCATION



VOLUME SUMMARY BY REACHES

							TOTAL
88/5.2	62/3.6	131/7.7	50/2.9	35/2.1	0/0	0/0	798/46.9
108/5.7	56/2.9	45/2.4	75/3.9	0/0	34/1.8	82/4.3	2495/131.3
56/18.7	38/12.7	103/34.3	0/0	203/67.7	30/10	102/34	1034/344.7
252/7.0	156/4.3	279/7.76	125/3.5	238/6.7	64/1.8	184/5.1	4327/120.2

722.3 721.8 720.3 719.4 718.2 716.5

LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON.)

...DE	DREDGE	
	LA CROSSE	HYDRAULIC
	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
d	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
	A. KERTZMAN (CONTRACTOR)	HYDRAULIC

VOL DREDGED (1000 cy)

HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN POOL 6

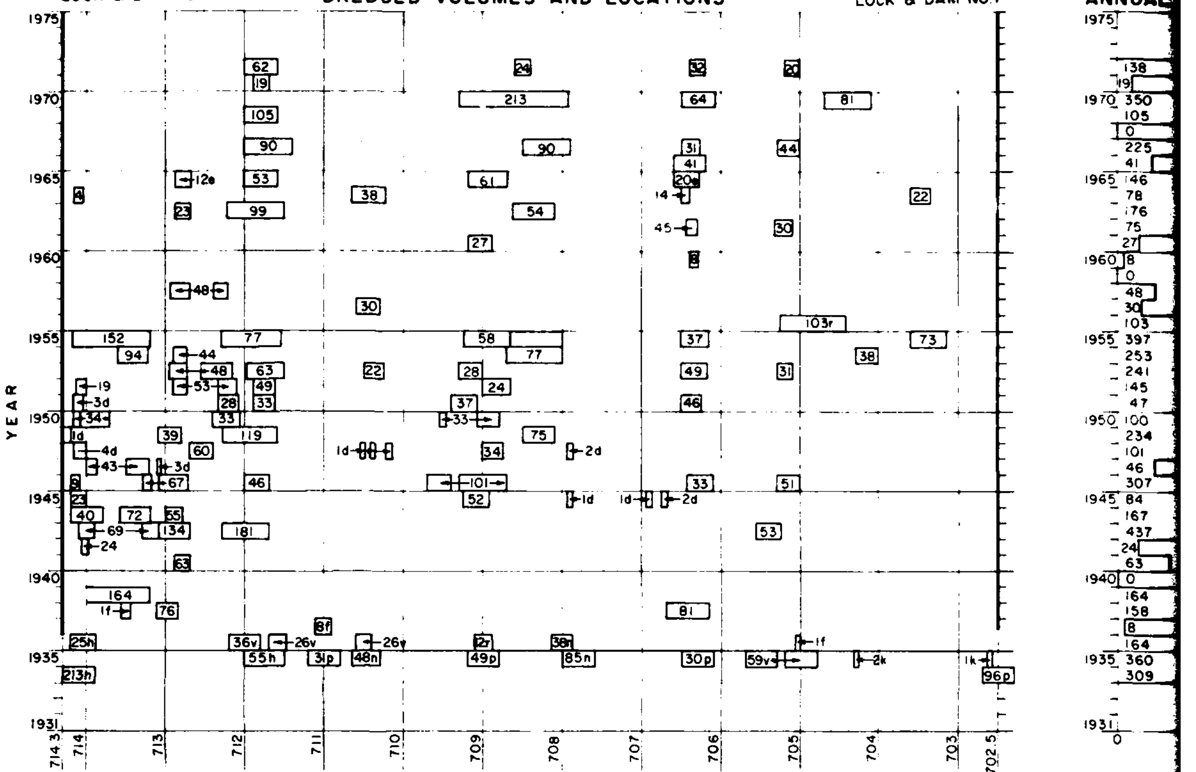
CORPS OF ENGINEERS

ST. PAUL DISTRICT

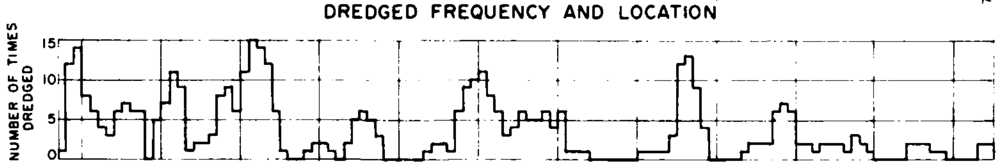
EXHIBIT 51

1 2

LOCK & DAM NO.6 DREDGED VOLUMES AND LOCATIONS LOCK & DAM NO.7 ANNUAL



DREDGED FREQUENCY AND LOCATION



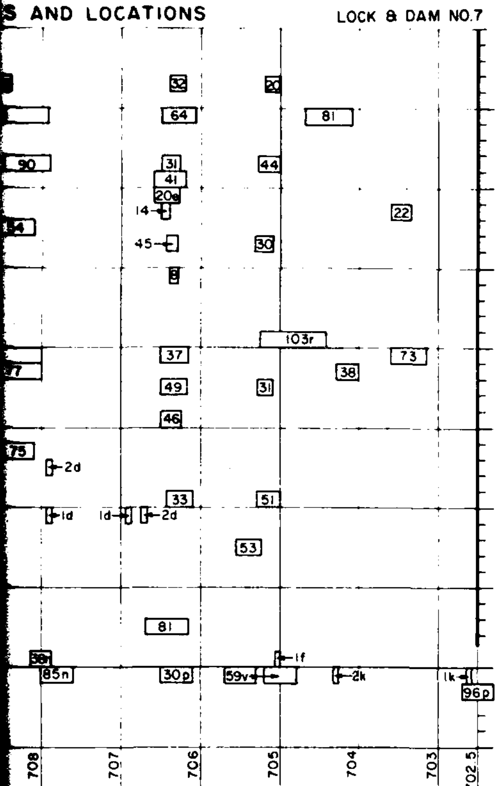
DREDGED VOLUME SUMMARY BY REACHES

TOTAL/AVERAGE ANNUAL										
1956-1972	4/2	59/3.5	452/26.6	0/0	68/4	469/27.6	255/15	278/16.4	22/1.3	1607/94 5
1937-1955	765/40.3	579/30.5	679/35.7	8/4	23/1.2	527/27.7	249/13.1	173/9 1	73/3 8	3076/161 9
1937-1972	769/21.4	638/17.7	1131/31.4	8/2	91/2 5	996/27 7	504/14	451/12.5	95/2 6	4683/130.1
1934-1936	238/79.3	0/0	117/39	31/10.3	74/24.7	184/61.3	30/10	62/20 7	97/32.3	833/277 7

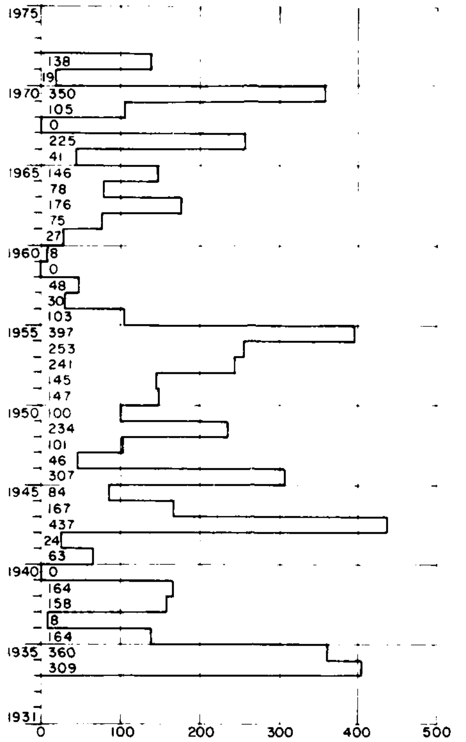
VOL DREDGED (1000 cy)

S AND LOCATIONS

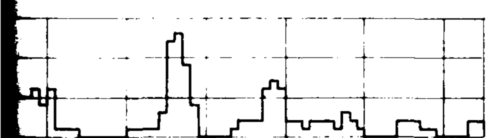
LOCK & DAM NO.7



ANNUAL SUMMARY OF DREDGED VOLUMES



CY AND LOCATION



MARY BY REACHES

27.6	255/15	278/16.4	22/1.3	1607/94.5
27.7	249/13.1	173/9.1	73/3.8	3076/161.9
27.7	504/14	451/12.5	95/2.6	4683/130.1
1.3	30/10	62/20.7	97/32.3	833/277.7

LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON.)

DREDGE CODES

CODE	DREDGE	NAME
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A. KERTZMAN (CONTRACTOR)	HYDRAULIC

VOL DREDGED (1000 cy)

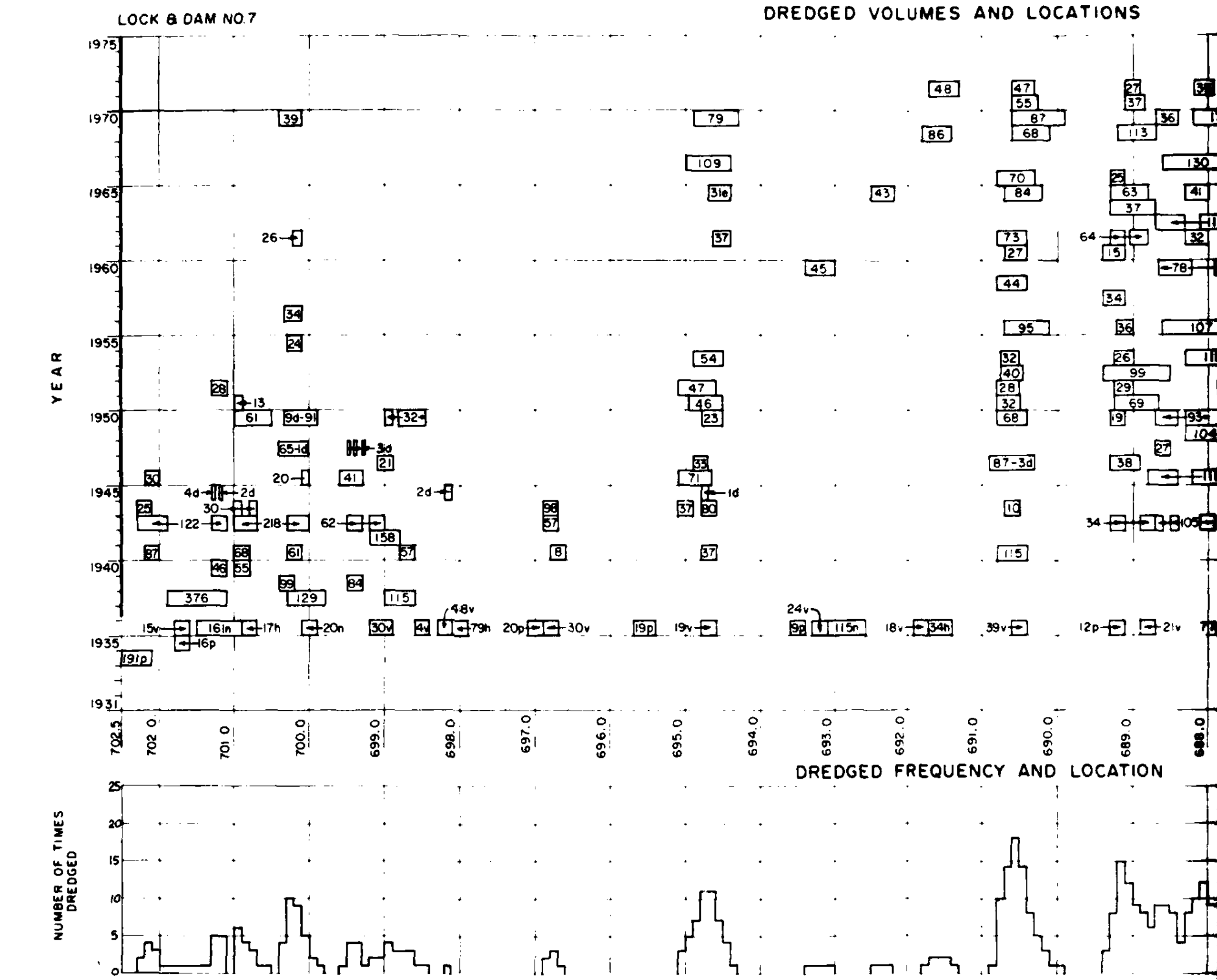
HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN POOL 7

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 52

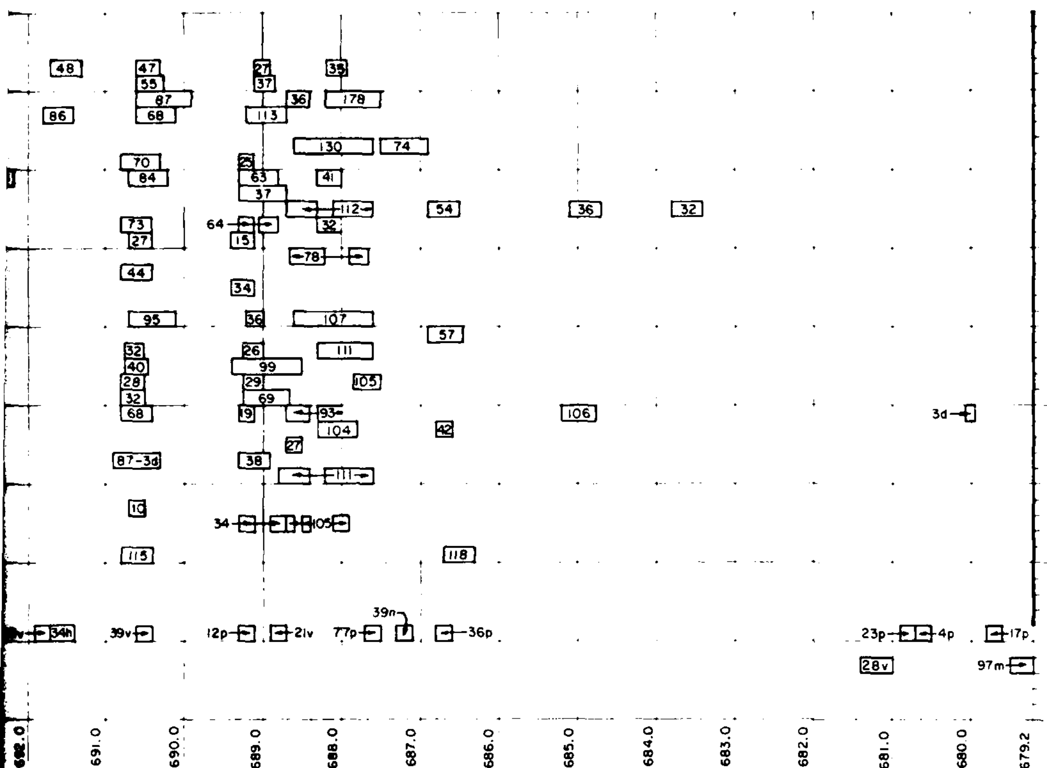
2



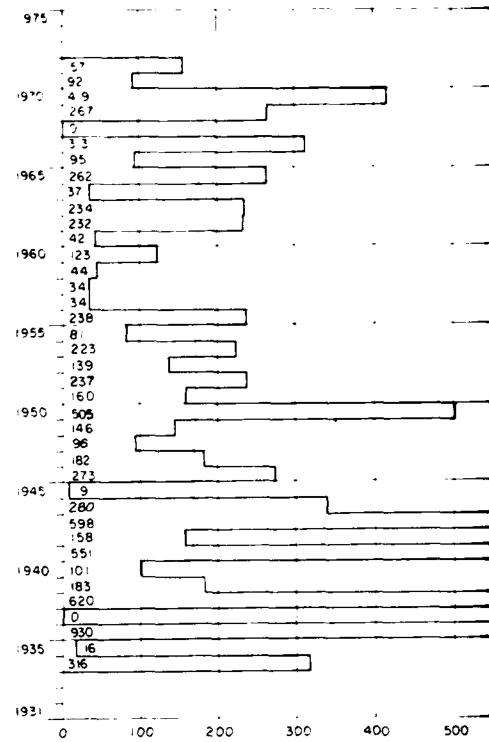
DREDGED VOLUME SUMMARY BY REACHES

TOTAL/AVERAGE ANNUAL	702.5–701.0	701.0–699.7	699.7–698.1	698.1–695.2	695.2–694.0	694.0–692.0	692.0–691.0	691.0–689.6	689.6–688.0
1956-1972	0/0	99/5.8	0/0	0/0	256/15.1	88/3.2	134/7.9	650/38.2	1200/70.6
1937-1955	720/37.9	944/49.7	575/30.3	163/8.6	429/22.6	0/0	0/0	415/21.8	970/51.1
1937-1972	720/20.0	1043/29.0	575/16.0	163/4.5	685/19.0	88/2.4	134/3.7	1065/29.6	2170/60.3
1934-1936	343/114.3	77/25.7	82/27.3	148/49.3	19/6.3	148/49.3	52/17.3	39/13.0	110/36.7

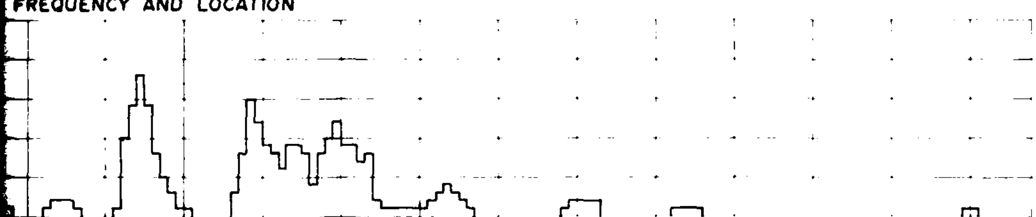
…LUMES AND LOCATIONS



ANNUAL SUMMARY OF D…



FREQUENCY AND LOCATION



…LUME SUMMARY BY REACHES

692.0–691.0	691.0–689.6	689.6–687.5	687.5–685.7	685.7–684.2	684.2–681.4	681.4–	
134/7.9	650/38.2	1200/70.6	128/7.5	36/2.1	32/1.9	0/0	2623/154.3
0/0	415/21.8	970/51.1	217/11.4	106/5.6	0/0	3/.2	4542/239.1
134/3.7	1065/29.6	2170/60.3	345/9.6	142/3.9	32/.9	3/.1	7165/199.0
52/17.3	39/13.0	110/36.7	75/25.0	0/0	0/0	169/56.3	1262/420.7

LEGEND

12e — VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON)

DREDGE CODES

CODE	DREDGE	
d	DERRICKBARGE HAUSER	CLAM S…
a	AMY A (CONTRACT)	HYDRAU…
c	CRANE BARGE 771	CLAM S…
e	BEAVER (CONTRACT)	HYDRAU…
f	DERRICKBOAT 336	CLAM S…
g	GEYSER	HYDRAU…
h	CAHABA	HYDRAU…
j	DERRICKBOAT 566	CLAM S…
k	LA CROSSE 84 (CONTRACT)	HYDRAU…
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGL…
m	LA CROSSE	HYDRAU…
n	DUNDEE	HYDRAU…
p	PELEE	HYDRAU…
r	ROCK ISLAND	HYDRAU…
s	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAU…
v	VESUVIUS	HYDRAU…
x	A. KERTZMAN (CONTRACTOR)	HYDRAU…

NOTE:
NO MAINTENANCE DREDGING HAS BEEN DONE ON THE BLACK RIVER. INTIAL CONTRACT DREDGING WAS DONE IN 1940.

VOL DREDGED (1000 cy)

HISTORICA…
THE LOCATIO…
OF DRE…

1 2

AM NO.8

17p

97m

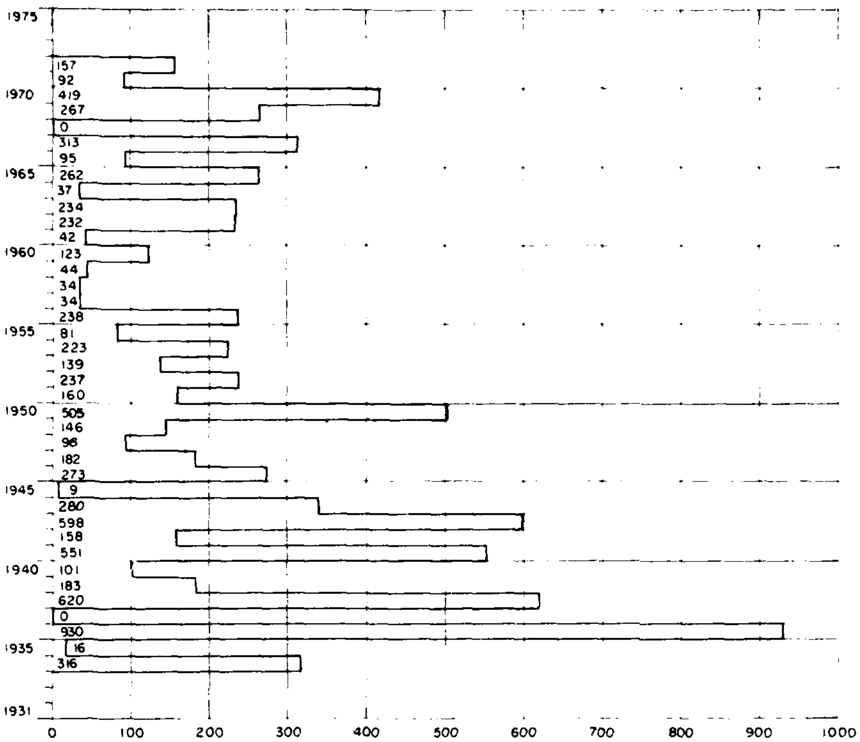
679.2

	2623/154 3
	4542/239 1
	7165/199 0
6.3	1262/420 7

EEN DONE ON
ACT DREDGING

VOL DREDGED (1000 cy)

ANNUAL SUMMARY OF DREDGED VOLUMES



LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON.)

DREDGE CODES

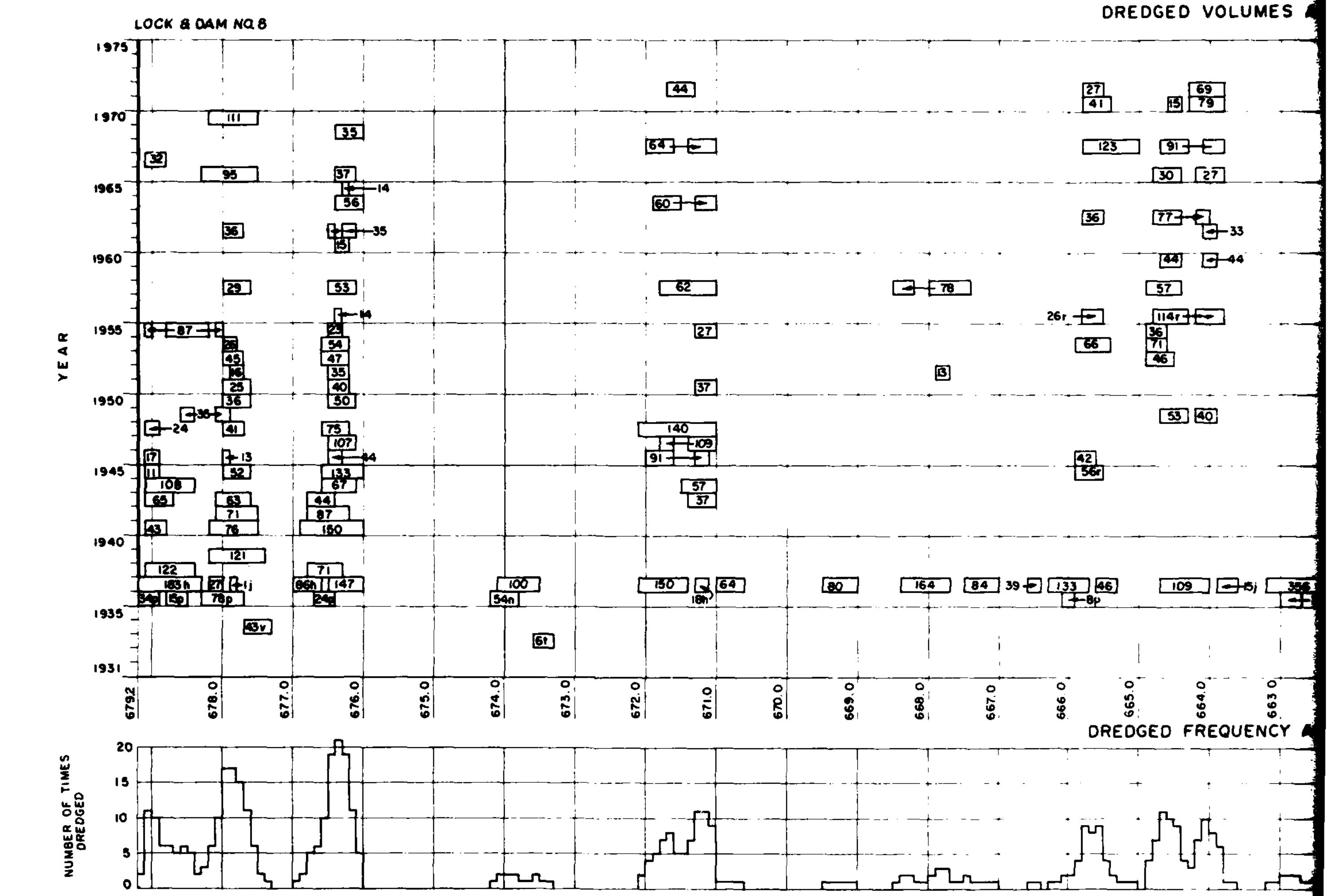
CODE	DREDGE	
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A. KERTZMAN (CONTRACTOR)	HYDRAULIC

HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN POOL 8

CORPS OF ENGINEERS

ST. PAUL DISTRICT

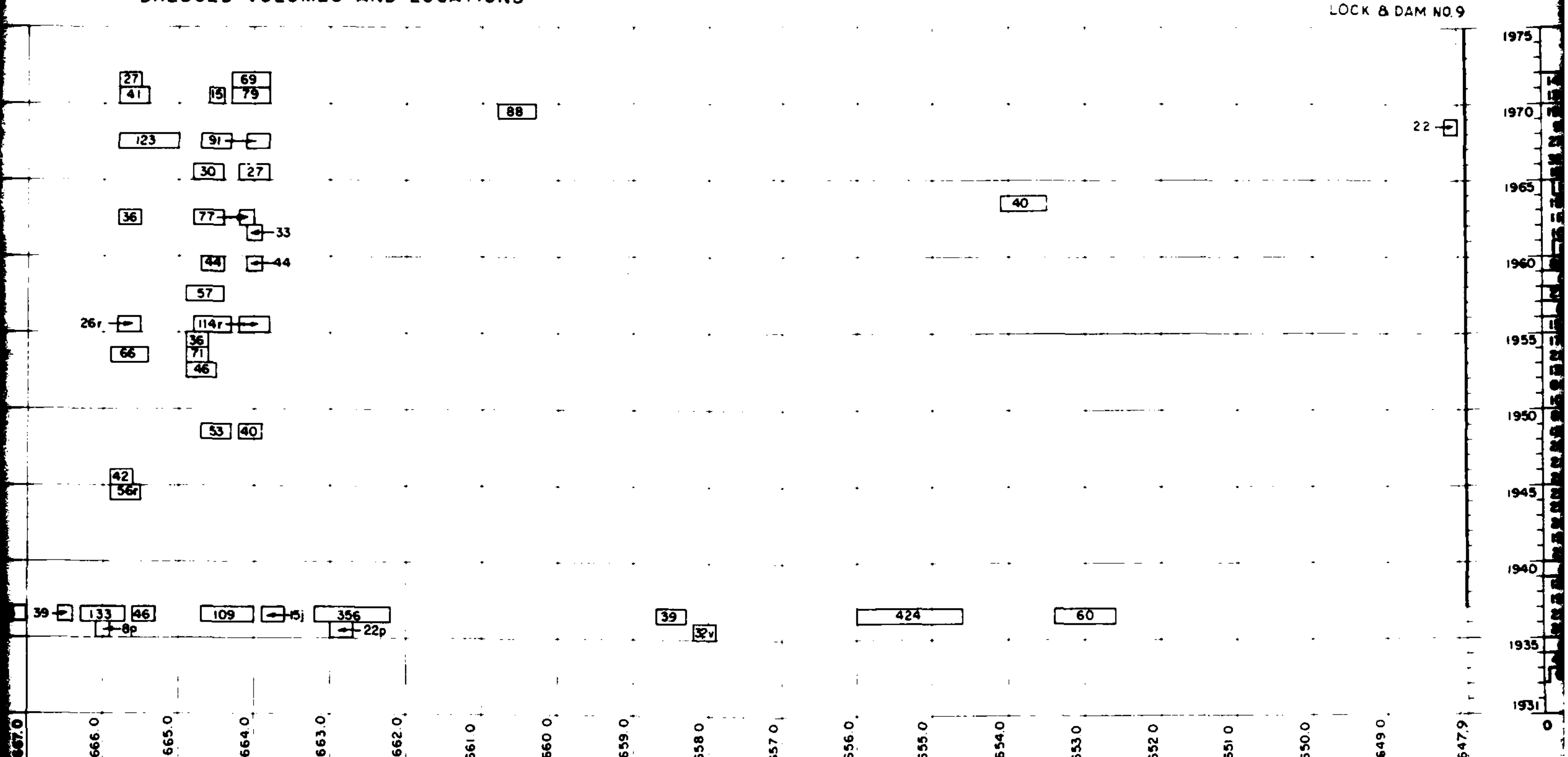
EXHIBIT 53



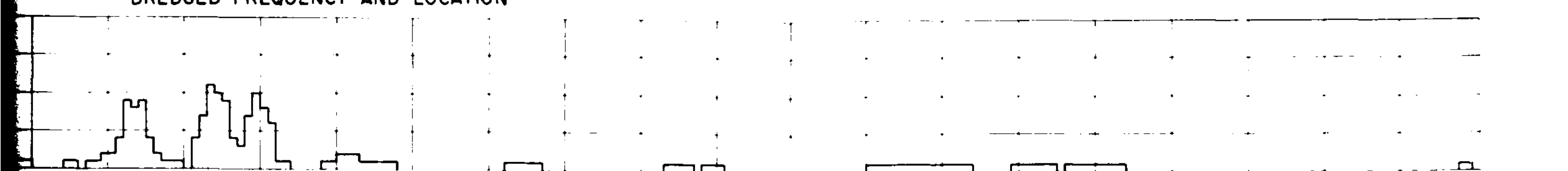
DREDGED VOLUME SUMM

TOTAL/AVERAGE ANNUAL	679.2–677.0	677.0–676.0	676.0–672.3	672.3–671.0	671.0–668.8	668.8–666.8	666.8–665.0	665.0–663.6	
1956—1972	303/17.8	259/15.2	0/0	230/13.5	0/0	78/4.6	253/14.9	680/40.0	6
1938—1955	1097/60.9	1027/57.1	0/0	498/27.7	0/0	13/0.7	164/9.1	246/13.7	6
1938—1972	1400/40.0	1286/36.7	0/0	728/20.8	0/0	91/2.6	417/11.9	926/26.5	6
1933—1937	381/76.2	257/51.4	160/32.0	168/33.6	144/28.8	248/49.6	226/45.2	124/24.8	37

DREDGED VOLUMES AND LOCATIONS



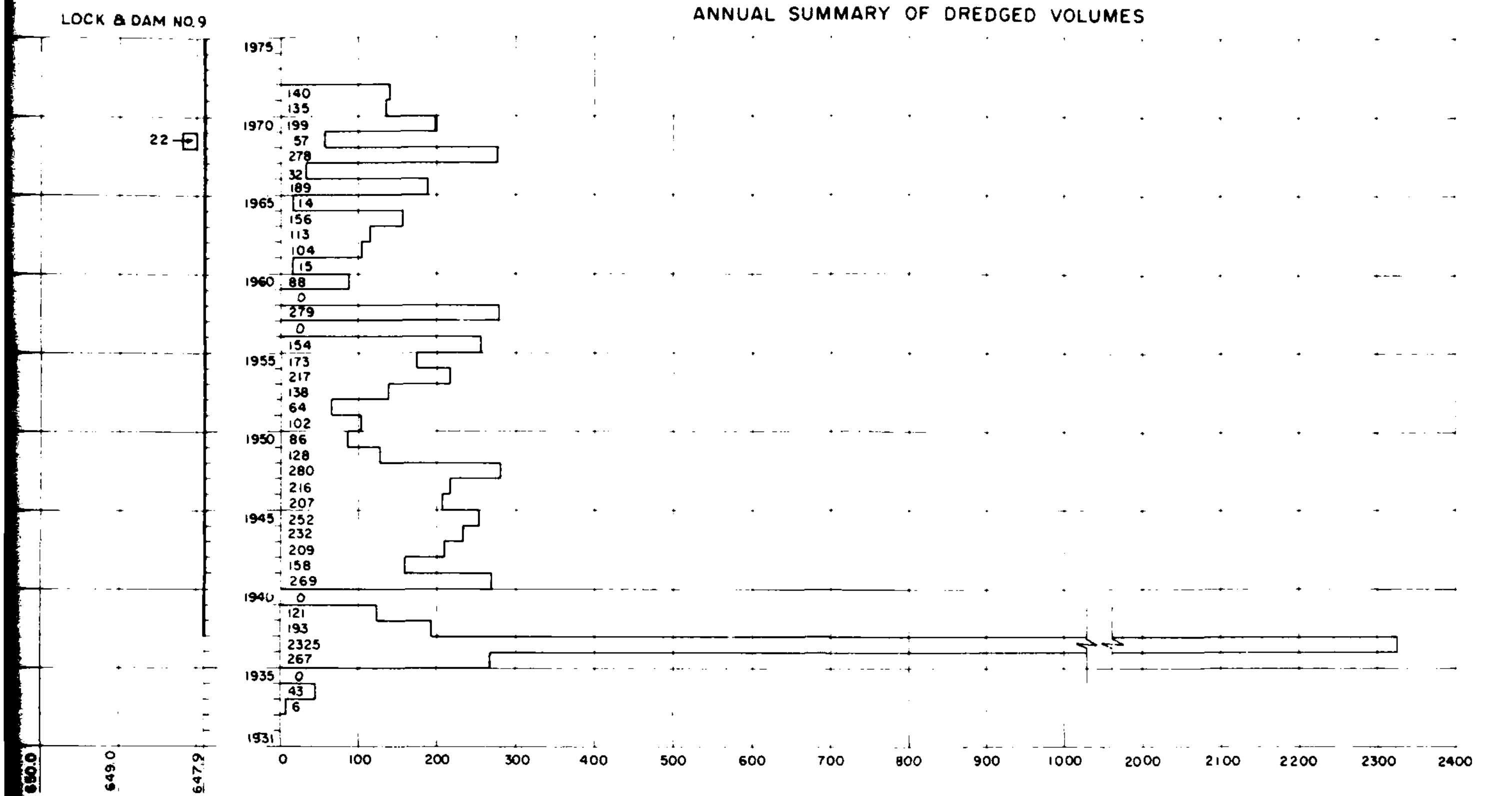
DREDGED FREQUENCY AND LOCATION



DREDGED VOLUME SUMMARY BY REACHES

666.8–665.0	665.0–663.6	663.6–661.0	661.0–660.0	660.0–654.4	654.4–649.0	649.0–	
253/14.9	680/40.0	0/0	88/5.2	0/0	40/2.4	22/1.3	1953/114.
164/9.1	246/13.7	0/0	0/0	0/0	0/0	0/0	3045/169.
417/11.9	926/26.5	0/0	88/2.5	0/0	40/1.1	22/0.6	4998/142.
226/45.2	124/24.8	378/75.6	0/0	495/99.0	60/12.0	0/0	2641/52

2



LEGEND

12e VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON.)

DREDGE CODES

CODE	DREDGE	
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 771	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST PAN
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE

CODE	DREDGE	
m	LA CROSSE	HYDRAULIC
n	DUNDEE	HYDRAULIC
p	PELEE	HYDRAULIC
r	ROCK ISLAND	HYDRAULIC
s	DIPPER DREDGE ST PAUL (CONTRACT)	DIPPER
t	TAAL	HYDRAULIC DUST PAN
v	VESUVIUS	HYDRAULIC
x	A KERTZMAN (CONTRACTOR)	HYDRAULIC

22/1.3	1953/114.9
0/0	3045/169.2
22/0.6	4998/142.8
0/0	2641/528.2

649.0

VOL DREDGED (1000 cy)

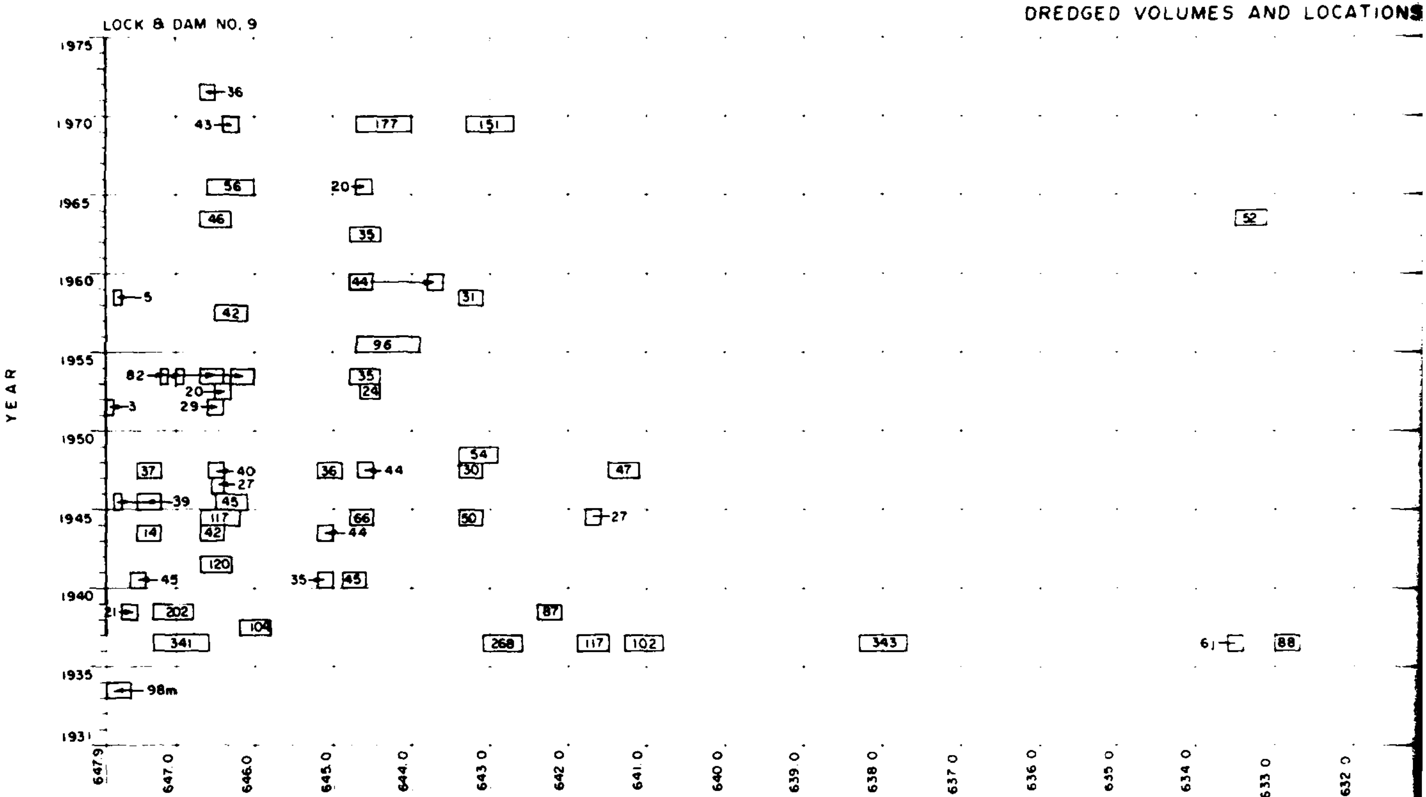
CORPS OF ENGINEERS

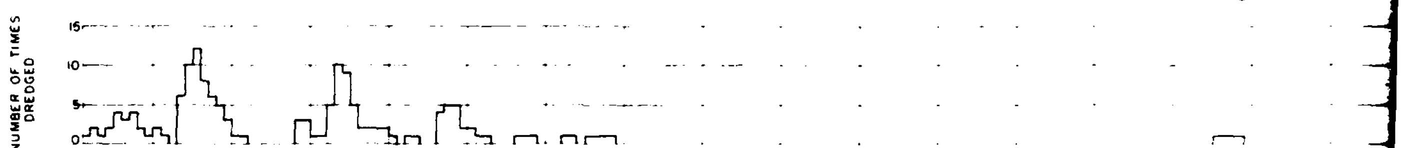
HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN POOL 9

ST. PAUL DISTRICT

EXHIBIT 54

DREDGED VOLUMES AND LOCATIONS





DREDGED FREQUENCY AND

TOTAL / AVERAGE ANNUAL	647.9–646.7	646.7–645.5	645.5–643.5	643.5–642.5	642.5–640.8	640.8–633.6	633.6–632.7
1956—1972	5/.3	223/13.1	272/21.9	182/10.7	0/0	0/0	52/3.1
1938—1955	383/21.3	604/33.6	329/18.3	134/7.4	161/8.9	0/0	0/0
1938—1972	388/11.1	827/23.6	701/20	316/9	161/4.6	0/0	52/1.5
1933—1937	339/67.8	100/20	0/0	268/53.6	219/43.8	343/68.6	94/18.8

DREDGED VOLUME SUMMARY BY REA

LEGEND

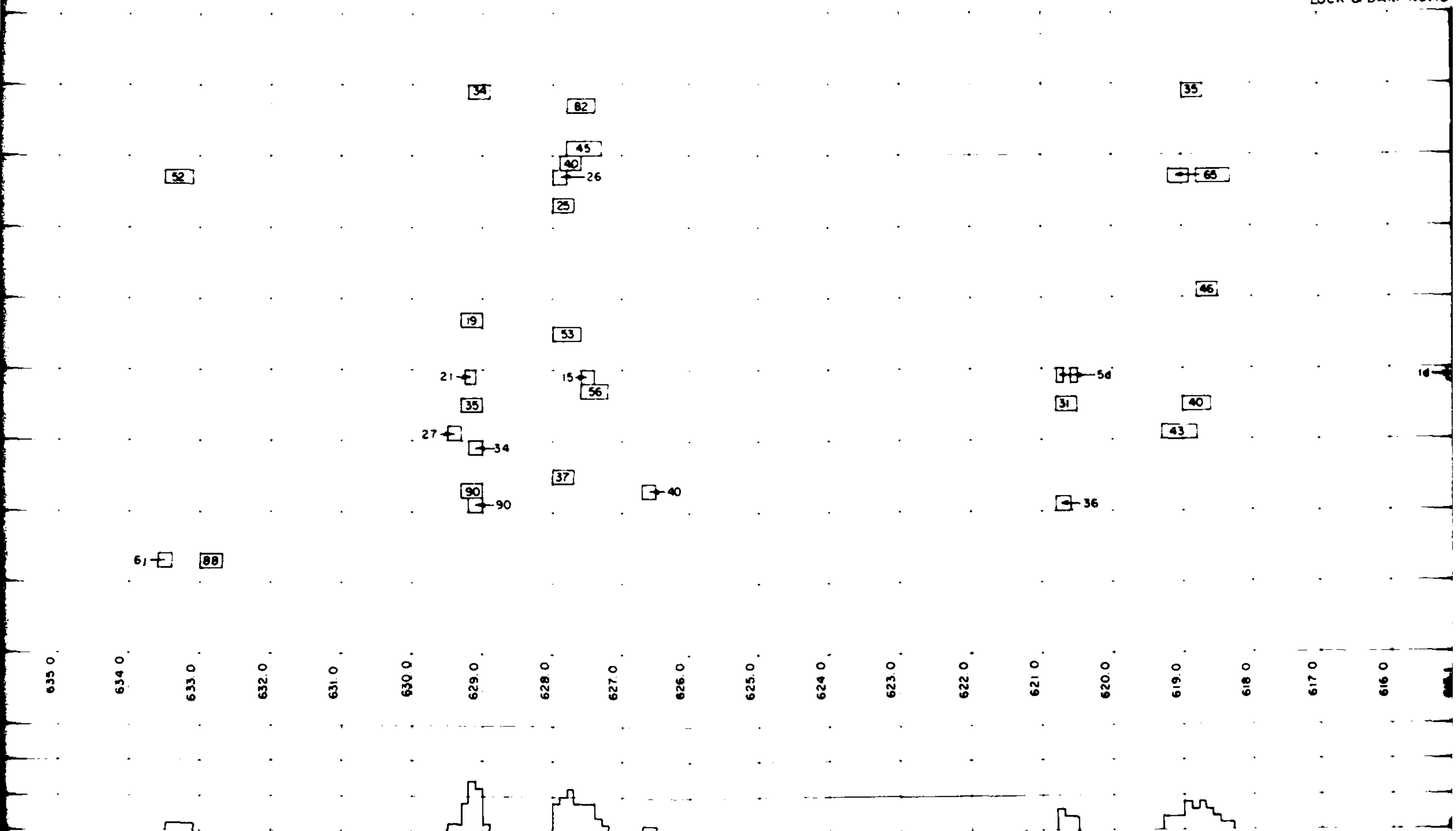
[12e] VOLUME OF MATERIAL DREDGED AND DREDGE DOING WORK (NO LETTER FOLLOWING NUMBER INDICATES WORK DONE BY DREDGE THOMPSON)

DREDGE CODES

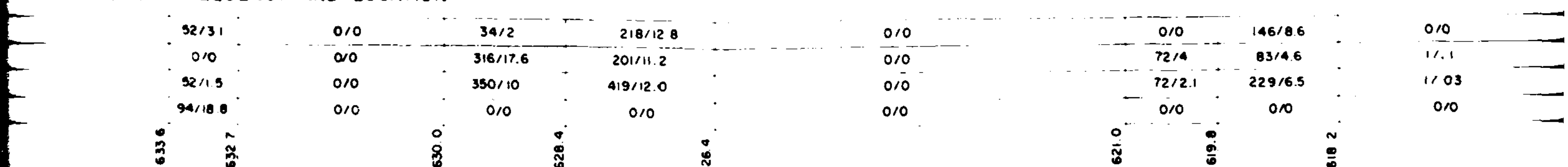
CODE	DREDGE	
d	DERRICKBARGE HAUSER	CLAM SHELL
a	AMY A (CONTRACT)	HYDRAULIC
c	CRANE BARGE 77	CLAM SHELL
e	BEAVER (CONTRACT)	HYDRAULIC
f	DERRICKBOAT 556	CLAM SHELL
g	GEYSER	HYDRAULIC
h	CAHABA	HYDRAULIC
j	DERRICKBOAT 566	CLAM SHELL
k	LA CROSSE 84 (CONTRACT)	HYDRAULIC DUST
l	SEIMS HELMER DRAGLINE (CONTRACT)	DRAGLINE

EDGED VOLUMES AND LOCATIONS

LOCK & DAM NO.10



DREDGED FREQUENCY AND LOCATION

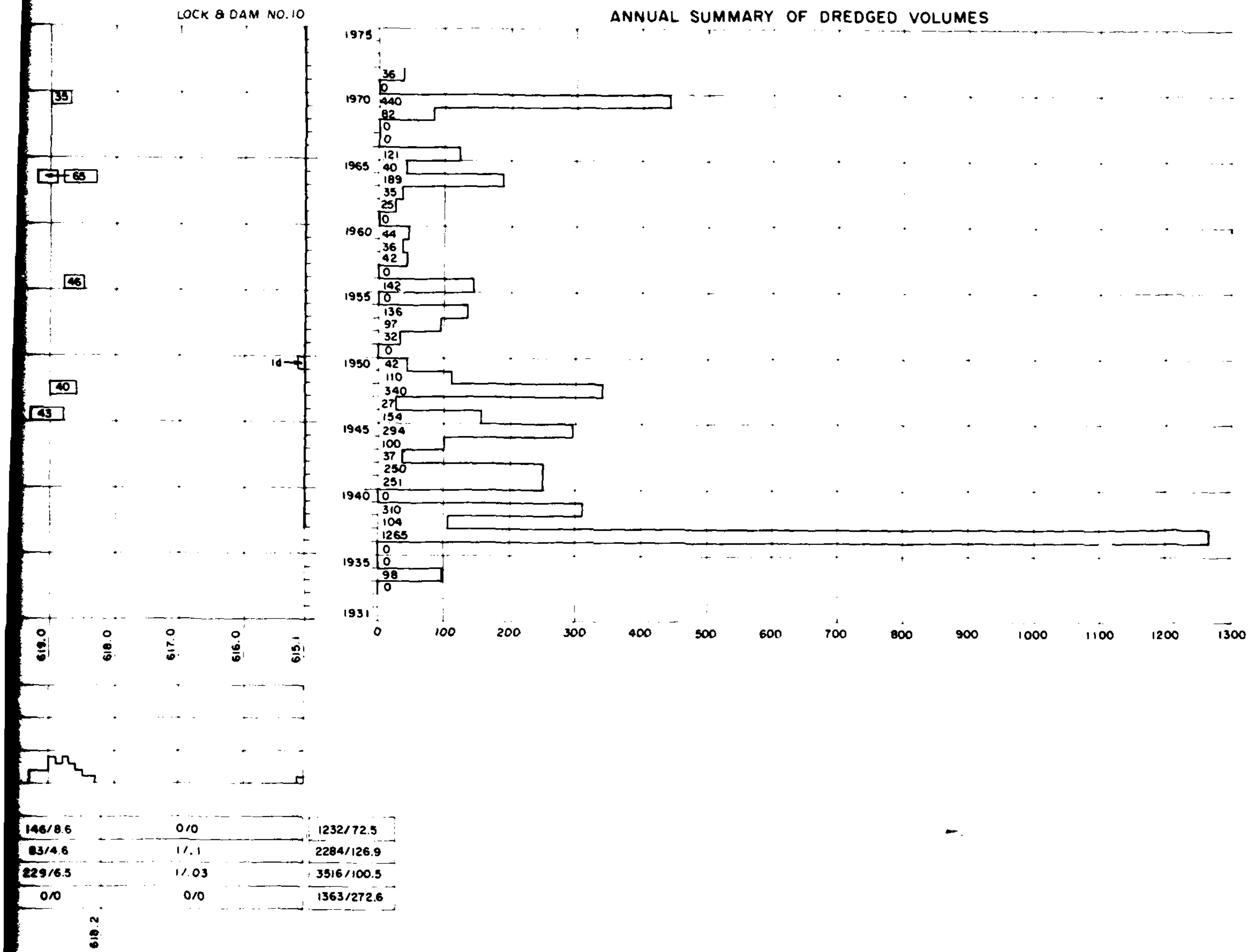


E VOLUME SUMMARY BY REACHES

AL DREDGED
WORK
ING NUMBER
ONE BY
.)

USER ——— CLAM SHELL
) ——— HYDRAULIC
) ——— CLAM SHELL
T) ——— HYDRAULIC
——— CLAM SHELL
——— HYDRAULIC
——— HYDRAULIC
——— CLAM SHELL
NTRACT) ——— HYDRAULIC DUST PAN
AGLINE (CONTRACT) ——— DRAGLINE

m — LA CROSSE ——— HYDRAULIC
n — DUNDEE ——— HYDRAULIC
p — PELEE ——— HYDRAULIC
r — ROCK ISLAND ——— HYDRAULIC
s — DIPPER DREDGE ST PAUL (CONTRACT) ——— DIPPER
t — TAAL ——— HYDRAULIC DUST PAN
v — VESUVIUS ——— HYDRAULIC
x — A KERTZMAN (CONTRACTOR) ——— HYDRAULIC



NOTE:

Add to the figures shown, a dredge cut of 97,000 cy. in 1968 at mile 627.8.

HISTORICAL TABULAR SUMMARY OF THE LOCATION, VOLUME AND FREQUENCY OF DREDGING IN POOL 10

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 55

DREDGING VOLUME SUMMARY BY POOL

Pool	Period: 1938-1955 — Average Annual Dredging Volume 1000 cu. yds.	1938-1955 — Total Dredged Quantity 1000 cu. yds.	1956-1972 — Average Annual Dredging Volume 1000 cu. yds.	1956-1972 — Total Dredged Quantity 1000 cu. yds.	1938-1972 — Average Annual Dredging Volume 1000 cu. yds.	1938-1972 — Total Dredged Quantity 1000 cu. yds.
U&LSAF	-	-	24.4[1]	391[1]	24.4[1]	391[1]
1	151.1[2]	2870[2]	113.0[1]	1808[1]	133.7	4678
Minnesota River	1.2[3]	23[3]	9.4	160	4.9[4]	183[4]
2	215.0[5]	4085[5]	142.7	2426	180.9[6]	6511[6]
St. Croix River	38.9	701	42.6	725	40.7	1426
3	113.9	2051	109.2	1856	111.6	3907
4	543.6[3]	10871[3]	293.7	4993	428.8[4]	15864[4]
5	258.4[7]	5426[7]	168.4[1]	2694[1]	219.5	8120
5A	193.1[5]	3668[5]	97.9	1664	148.1[6]	5332[6]
6	131.1[5]	2495[5]	46.5	798	91.5[6]	3293[6]
7	161.9[5]	3076[5]	94.5	1607	130.1[6]	4683[6]
Black River	-	-	-	-	-	-
8	239.1[5]	4542[5]	154.3	2623	199.0[6]	7165[6]
9	169.2	3045	114.9	1953	142.8	4998
10	126.9	2284	78.2	1329	104.0	3613
TOTAL	2343.4	45137	1489.7	25027	1960.0	70164

1 - 1957-72
2 - 1938-56
3 - 1936-55
4 - 1936-72
5 - 1937-55
6 - 1937-72
7 - 1936-56

CORPS OF ENGINEERS
ST. PAUL DISTRICT

DREDGING VOLUME SUMMARY BY POOL

EXHIBIT 56

POOL OPERATION, PRIMARY AND SECONDARY CONTROL DATA

Pool No.	Project Pool Elev. at Primary Control Point	Peak Discharge in cfs for Primary Control	Maximum Allowable Drawdown at the Dam	Secondary Control Elev. at the Dam	Peak Discharge in cfs for Secondary Control
2	687.20	18,000	0.7	685.20	50,000
3	675.00	16,000	1.0	673.00	31,000
4	667.00	29,000	0.5	665.50	65,000
5	660.00	36,000	0.5	658.50	92,000
5A	651.00 (a)	23,000	1.0	650.00	59,000
6	645.50	26,000	1.0	644.50	75,000
7	639.00 (b)	82,000	0.0	- - -	- - -
8	631.00	26,000	1.0	629.50	87,000
9	620.00	32,000	1.0	619.00	63,000
10	611.00 (c)	36,000	1.0 (c)	611.80 (d)	64,000

(a) Tailwater of Dam No. 5.

(b) Primary control only, maintained at the dam.

(c) At Dam No. 10.

(d) At Clayton, Iowa (control point No. 10).

Mississippi River-St. Paul District
Federal Harbor Improvements

Name	Miles above Ohio River	Location	Type	Project depth (feet)	Approximate size (feet) Width	Length	Percent complete	Actual or estimated cost
Harriet Island Harbor, St. Paul, Minn.	840.2	In city of St. Paul	Small-boat	5	70	925	0	$ 80,000
St. Paul Harbor, Minn.	836.5-839.2	In city of St. Paul, Minn.	Commercial	9	400-1,000	2.7(mile)	100	217,100
	839.7	Channel improvement. Small-boat harbor and channel enlargement	Small-boat	5	0-300	400	100	230,200
Hastings Harbor, Minn.	813.2	Lower end of city of Hastings, Minn.	Small-boat	5	200	500	100	74,300
Red Wing Harbor, Minn.	791.4	In city of Red Wing, Minn.	Commercial	9	300	1,200	100	146,800(2)
Red Wing Harbor, Minn.	791.1	In city of Red Wing, Minn.	Small-boat	5	450	800	100	8,700
Bay City Harbor, Wis.	785.9	Upper end of Bay City, Wis.	Small-boat	5	50- 100	5,990	100	39,400(3)
Lake City Harbor, Minn.	773.0	In city of Lake City, Minn.	Small-boat and	5	400	600	100	93,508
			Commercial	9	500	1,000	100	
Pepin Harbor, Wis.	767.1	In city of Pepin, Wis.	Small-boat	5	50	600	100	215,100(4)
Wabasha Harbor, Minn.	760.0	Upper end of city of Wabasha, Minn.	Small-boat	5	175- 400	800	100	41,700
Alma Harbor, Wis.	751.3	Upper end of Alma, Wis.	Small-boat	5	300	500	100	56,300
Winona Harbors, Minn.	726.0	In city of Winona, Minn. Latsch Island	Small-boat	5	200	1,000	100	89,800
	726.2	Crooked Slough	Commercial	9	200	6,000	100	84,700
Lansing Harbor, Iowa	663.3	Upper end of city of Lansing, Iowa	Small-boat	5	170	500	100	95,300
Prairie du Chien Harbor, Wis.	635.5	Upper end of city of Prairie du Chien, Wis.	Small-boat	5	400	800	100	85,500
	635.0	In Marais de St. Friol East Channel below Hwy. bridges.	Commercial	9	-	1,000 ft frontage	100	93,100

(1) In addition, local interests will contribute $80,000.
(2) In addition, local interests contributed $3,455.
(3) In addition, local interests contributed $9,500.
(4) In addition, local interests contributed $15,759 and will contribute an additional $17,000.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 58

MISSISSIPPI RIVER, ST. PAUL DISTRICT
FEDERAL HARBOR IMPROVEMENTS

Maintenance dredging at boat harbors in St. Paul District (cy)

Harbor	River Mi	Type [1]	Year Comp	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961 [2]	Total
Harriet Is.	840.2	SB	-				21,308	9,072								30,380
St. Paul	836.5–839.2	Comm	1949													
	839.7	SB	1949		12,841							9,614		11,458		33,913
Hastings	813.2	SB	1957			7,184					1,675		4,655			13,514
Red Wing	791.4	Comm	1962													
	791.1	SB	1947										5,605			5,605
Bay City	785.9	SB	1965													-
Lake City	773.0	SB	1948								243					243
	773.0	Comm	1948													-
Pepin	767.1	SB	1965													-
Wabasha	760.0	SB	1949													-
Alma	751.3	SB	1963			3,104					5,365 [3]					8,469
Winona	726.0	SB	1958	3,348	1,098	13,286	5,728	-	8,917	6,289	4,090				453	43,209
	726.2	Comm	1956			531				3,681						4,212
Lansing	663.3	SB	1959													-
Prairie du Chien	635.5	SB	1960													-
	635.0	Comm	1958													-
Totals				3,348	13,939	24,105	27,036	9,072	8,917	9,970	11,373	9,614	10,260	11,458	453	139,545
															Average Annual=	11,629

(1) SB = small boat Comm = commercial
(2) No maintenance dredging performed prior to 1961 for harbors.
(3) Contractor dredging

CORPS OF ENGINEERS

ST. PAUL DISTRICT

MAINTENANCE DREDGING AT BOAT HARBORS
IN ST. PAUL DISTRICT

EXHIBIT 59

MISSISSIPPI RIVER POOLS, ST. PAUL DISTRICT
FEDERAL LAND AREAS, WATER AREAS & SHORELINE DISTANCES

Pool No.	Above Water Fed. Land (Ac) C of E	BSF&W	Total	Water Area (Ac)	Total[1] (Ac)	Shoreline (Mi)
USAF	2		2	974	976	23
LSAF	4		4	51	55	1
1	16		16	546	562	12
2[2]	55		55	9,652	9,707	110
3[2]	3,430	68	3,498	17,950	21,448	37
4	1,769	4,836	6,605	35,198	41,803	155
5	2,044	2,109	4,153	10,836	14,989	50
5A	2,670	1,250	3,920	6,140	10,060	35
6	295	1,345	1,640	8,870	10,510	55
7	2,340	4,730	7,070	13,440	20,510	37
8	3,945	6,337	10,282	20,810	31,092	85
9	6,620	12,170	18,790	29,125	47,915	90
10	2,255	8,840	11,095	17,070	28,165	110
TOTAL	25,445	41,685	67,130	170,662	237,792	800

1. Includes Federal lands only.

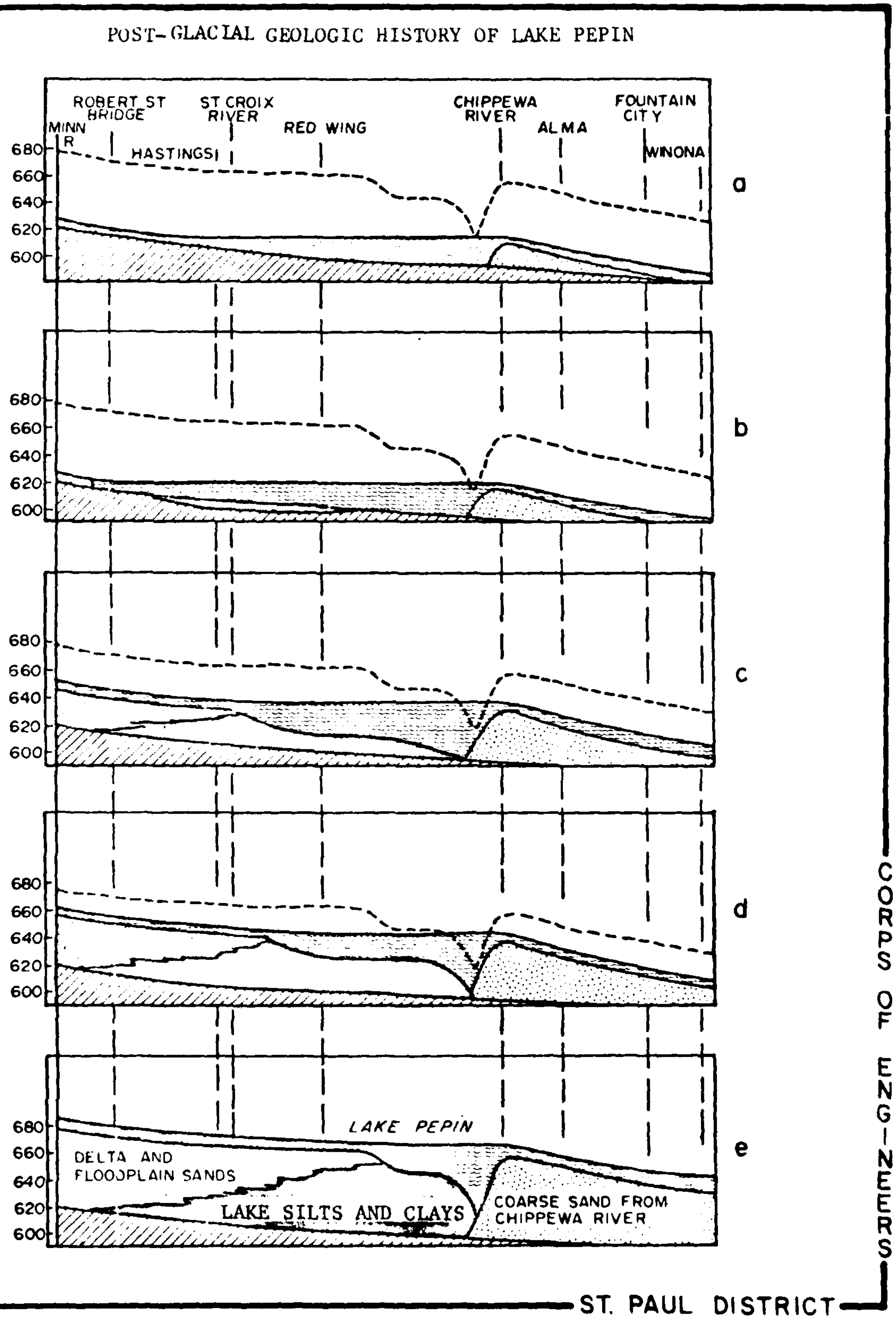
2. Mississippi River only.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 60 MISSISSIPPI RIVER POOLS, ST. PAUL DISTRICT
FEDERAL LAND AREAS, WATER AREAS & SHORELINE DISTANCES

POST-GLACIAL GEOLOGIC HISTORY OF LAKE PEPIN



POST-GLACIAL GEOLOGIC HISTORY OF LAKE PEPIN

EXHIBIT 61

FLOOD VOLUMES - TRIBUTARY STREAMS AND MAINSTEM STATIONS

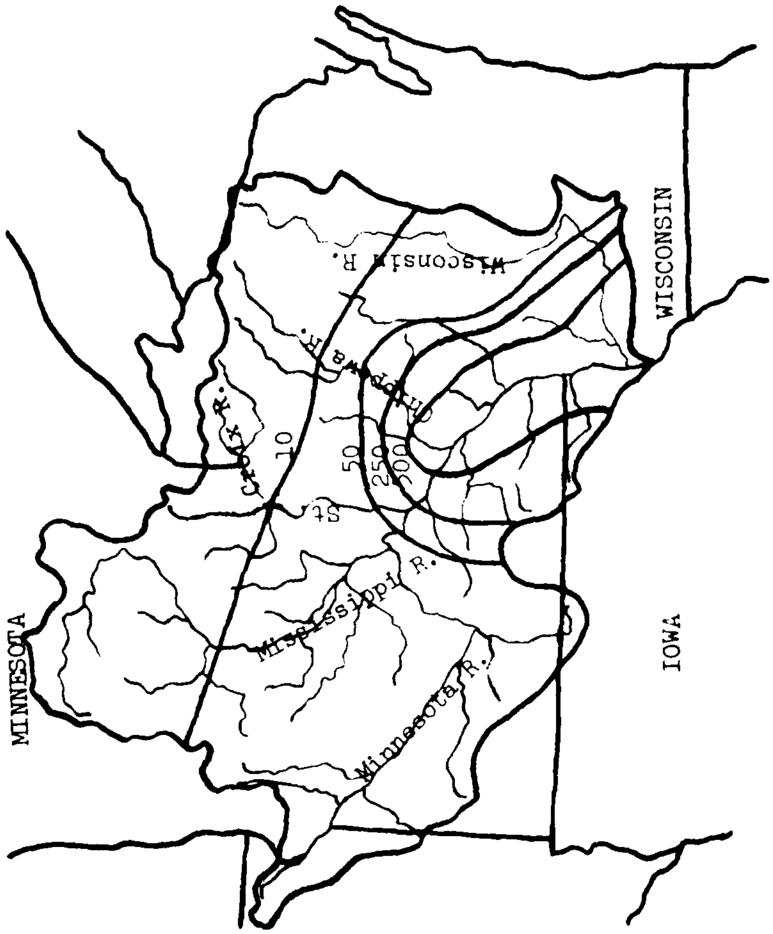
Basin	Key Station	Avg. Ann. Runoff (100,000 ac-ft)	Drainage Area (sq. mi.)	Flood Year	Dates Above Base From	Dates Above Base To	Flood Volume (acre-feet)	Flood Volume (in. over basin)	Instantaneous Peak(cfs)
Mississippi Headwaters	Anoka, Minnesota	45.6	19,100	1965	3-30	7-29	4,815,900	4.73	91,000
				1950	3-24	7-23	3,756,700	3.69	50,700
				1943	3-26	8-2	3,395,800	3.33	47,000
				1969	3-19	6-14	3,045,307	2.99	72,500
				1952	3-26	6-9	2,538,900	2.49	75,000
Chippewa	Durand, Wisconsin	52.6	9,010	1936	3-10	5-30	2,424,900	5.05	54,400
				1950	3-21	6-4	2,318,400	4.82	46,200
				1943	5-25	7-18	2,314,300	4.82	80,700
				1954	4-6	5-24	1,896,800	3.94	101,000
				1951	3-27	5-13	1,819,800	3.79	71,800
Wisconsin	Muscoda, Wisconsin	61.5	10,300	1916	3-25	6-27	2,953,000	5.38	54,300
				1929	3-4	5-19	2,451,100	4.46	51,800
				1924	4-1	6-8	2,207,800	4.02	41,400
				1920	3-9	5-9	1,679,400	3.06	64,400
				1960	4-12	6-14	1,669,100	3.04	67,200
Root	Houston, Minnesota	4.7	1,270	1965	3-31	4-19	284,200	4.20	19,800
				1936	3-10	4-6	177,400	2.62	10,800
				1961	3-21	4-10	175,000	2.58	31,400
				1965	2-28	3-13	84,600	1.25	31,000
				1945	3-9	4-1	157,700	2.33	23,900
Minnesota	Mankato	17.4	14,900	1965	4-1	7-6	3,638,080	4.58	94,100
				1969	3-16	6-17	3,430,622	4.32	76,700
				1951	3-27	6-15	2,471,040	3.11	66,600
				1952	3-12	5-23	2,229,400	2.80	53,500
				1908	5-15	8-1	2,181,440	2.74	54,500
Mississippi Main Stem	St. Paul, Minnesota	71.2	36,800	1965	4-2	7-5	8,769,900	4.47	171,000
				1969	3-17	6-22	7,461,193	3.80	156,000
				1952	3-13	6-8	5,690,200	2.90	125,000
				1916	3-17	6-23	5,233,200	2.67	73,500
				1951	3-28	6-18	4,590,900	2.34	92,800
	Winona	176.0	59,200	1965	3-31	7-5	15,047,000	4.76	268,000
				1951	3-25	8-4	11,790,300	3.73	178,000
				1944	3-22	8-6	11,666,200	3.69	105,000
				1950	3-22	7-6	10,489,800	3.32	122,000
				1969	3-14	6-17	10,271,356	3.25	218,000

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 62 FLOOD VOLUMES- TRIBUTARY STREAMS AND MAINSTEM STATIONS

ANNUAL SEDIMENT YIELD FOR 100 SQUARE MILE DRAINAGE AREA
TONS/SQUARE MILE



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ANNUAL SEDIMENT YIELD FOR 100 SQUARE MILE
DRAINAGE AREA, TONS/SQUARE MILE

EXHIBIT 63

RATIO:

Sediment Yield/Square Mile for Drainage Area of Given Size
Sediment Yield/Square Mile for 100 Square Mile Drainage Area

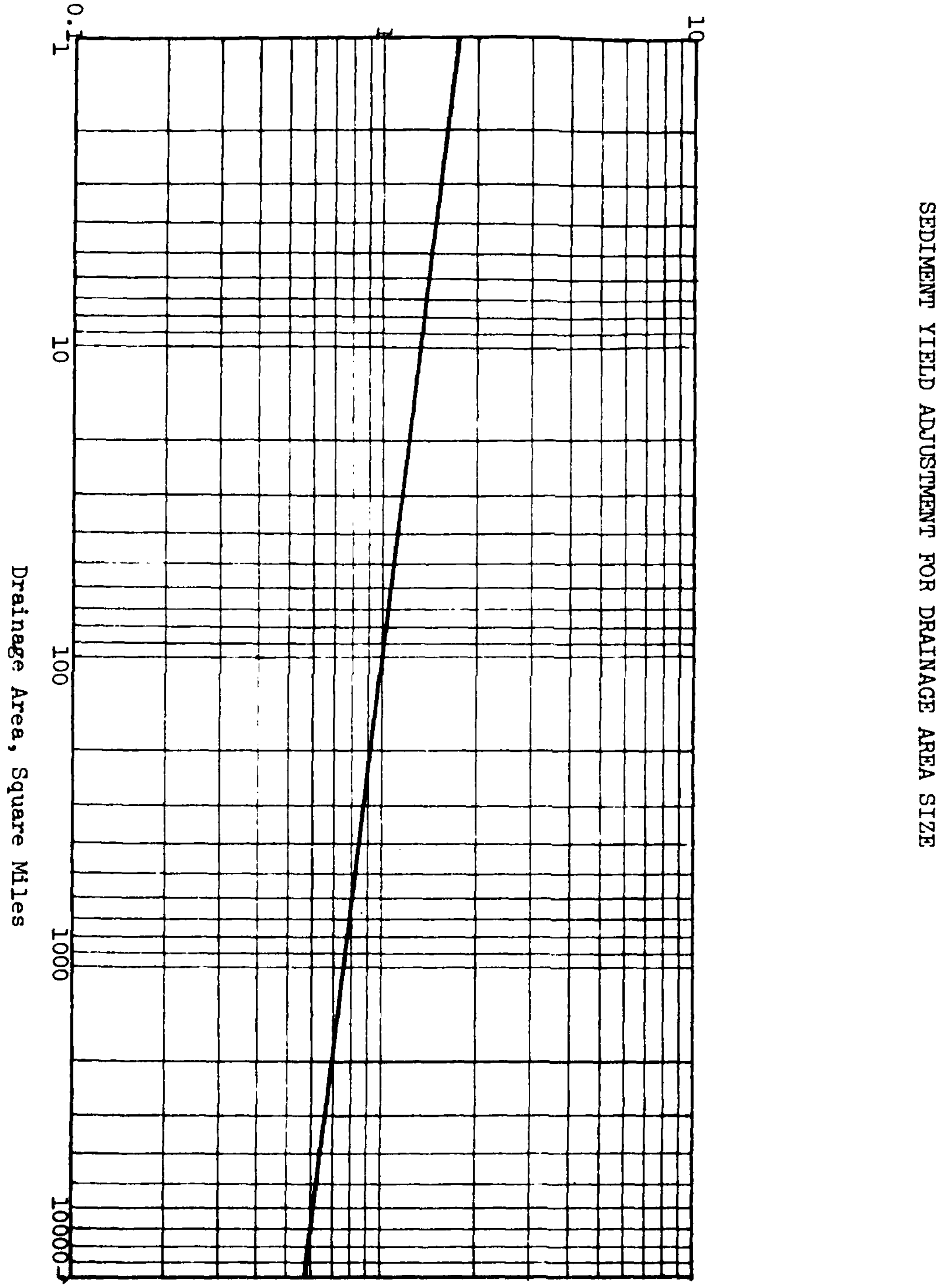

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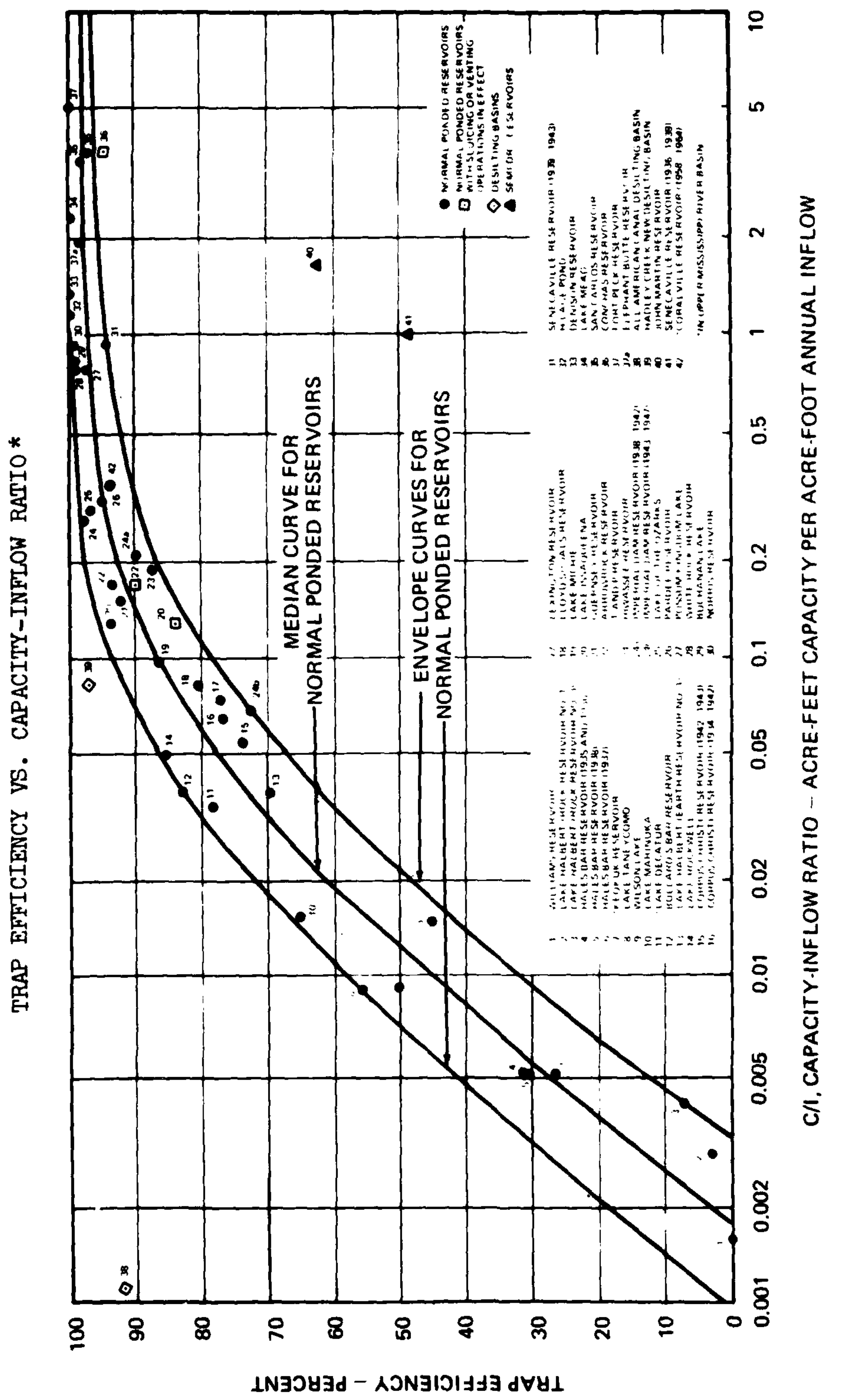
EXHIBIT 64 SEDIMENT YIELD ADJUSTMENT FOR DRAINAGE AREA SIZE



* Transactions, American Geophysical Union, Vol. 34, No. 3, June 1953.

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TRAP EFFICIENCY VS. CAPACITY-INFLOW RATIO

EXHIBIT 65

SEDIMENTATION IN NAVIGATION POOLS - TRAP EFFICIENCY METHOD

Pool	River Mile of Lock and Dam	Total Average Annual Incoming Sediment Tons/Yr	Trap Efficiency[1] %	Average Annual Sediment Trapped Tons/Yr	Average Annual Sediment Passed Tons/Yr	Average Annual Dredging[2] Tons/Yr	Percent of Incoming Sediment Dredged %	Percent of Trapped Sediment Dredged %
Upper and Lower SAF	854.1							
Combined w/Pool 1	847.6	551,000[5]	0[3]	209,000[4]	342,000	209,000	38	NA
Pool 2	815.2	1,275,000	46	587,000	688,000	193,000	15	33
Pool 3	796.9	1,043,000	65	678,000	365,000	147,000	14	22
Pool 4 (Above Outlet of Lake Pepin)	764.7	866,000	70	606,000	260,000	97,000	11	16
Pool 4 (Below Lake Pepin)	752.4	1,530,000[5]	10	294,000[4]	1,236,000	294,000	19	NA
Pool 5	738.1	2,040,000	15	306,000	1,734,000	227,000	11	74
Pool 5A	728.5	2,048,000[5]	0[3]	132,000[4]	1,916,000	132,000	6	NA
Pool 6	714.3	2,470,000	4	99,000	2,371,000	64,000	3	65
Pool 7	702.5	2,836,000	17	482,000	2,354,000	128,000	5	27
Pool 8	679.2	3,655,000	27	987,000	2,668,000	201,000	5	20
Pool 9	647.9	3,708,000	41	1,520,000	2,188,000	155,000	4	10
Pool 10	615.0	5,058,000	27	1,366,000	3,692,000	87,000	2	6

NOTES:
1. Using median curve.
2. Based on records from 1956-1972 where available and applicable.
3. Due to probable inherent inaccuracy in lower end of trap efficiency curve when applied to navigation pools in study area.
4. Partially adjusted for inaccuracies in trap efficiency curve and sediment from sources not accounted for in method. *Actual quantity trapped exceeds value shown by some indeterminate amount.*
5. Partially adjusted for sediment from sources not accounted for in method. Value shown should be further adjusted by same indeterminate amount discussed in footnote 4.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 66

SEDIMENTATION IN NAVIGATION POOLS -
TRAP EFFICIENCY METHOD

TEXTURES OF SAMPLES FROM POOLS 4, 5, 5A, AND 6

Pool	Sample Location			Percentage of Samples Within Given Size Range						
				U. S. Standard Sieve Number	230	120	60	35	18	10
				Grain Size, mm	.063	.125	.25	.50	1.0	2.0
	River Mile	Spoil	Channel Bottom	Grain Description	V. Fine Sand	Fine Sand	Medium Sand	Coarse Sand	V. Coarse Sand	Granule
4	763.5		X		0.2	2.6	59.3	36.1	1.6	0.2
	759.2	X			0.1	3.0	49.2	40.5	6.3	0.9
	763.0	X			0.2	4.4	52.3	34.4	7.2	1.5
	763.0		X		0.1	1.2	32.0	44.2	16.2	6.3
	761.9		X		0.2	5.6	35.9	48.7	8.4	1.2
	760.1		X		0.0	0.8	15.4	38.0	29.5	16.3
	757.6		X		0.4	9.3	64.2	22.0	2.9	1.2
	755.1		X		0.5	6.0	66.5	22.9	3.6	0.5
	754.0		X		0.6	4.2	31.4	43.8	16.0	4.0
	753.0		X		2.1	11.1	70.4	14.8	1.5	0.1
5	749.3	X			0.2	2.6	36.0	46.9	11.3	3.0
	741.8		X		0.1	2.9	35.3	43.3	13.2	5.2
	745.1		X		0.5	4.7	68.4	13.2	13.1	0.1
	743.7	X			2.3	9.2	38.7	23.5	14.7	11.6
5A	735.7		X		0.2	2.0	29.5	48.9	18.3	1.1
	733.7		X		0.2	7.8	39.2	36.9	13.9	2.0
	731.3		X		0.1	0.1	33.6	43.7	18.6	3.9
	729.5		X		5.1	26.7	34.9	16.1	7.6	9.6
	730.7	X			0.5	3.9	43.1	39.3	11.0	2.2
6	715.6		X		0.5	3.4	40.4	39.2	13.1	3.4
	718.8		X		2.0	12.6	68.3	16.2	0.8	0.1
	720.2	X			1.2	10.1	65.8	8.4	11.9	2.6
	721.9	X			0.5	2.7	57.7	31.9	5.4	1.8
	724.7		X		0.8	2.3	41.5	47.7	6.1	1.6
	726.6		X		0.3	1.5	26.0	67.3	4.8	0.1

CORPS OF ENGINEERS

ST. PAUL DISTRICT

TEXTURES OF SAMPLES FROM POOLS 4, 5, 5A, AND 6

EXHIBIT 67

TEXTURES OF SAMPLES FROM TRIBUTARY STREAMS ENTERING POOLS 4, 5, 5A, AND 6

Tributary	Sample Location				Percentage of Samples within Given Size Range					
				U. S. Standard Sieve Number	230 – 120	120 – 60	60 – 35	35 – 18	18 – 10	10 –
				Grain Size, mm	.061 – .125	.125 – .25	.25 – .50	.50 – 1.0	1.0 – 2.0	2.0 –
	Miles Upstream	Bar	Channel Bottom	Grain Description	V. Fine Sand	Fine Sand	Medium Sand	Coarse Sand	V. Coarse Sand	Granule
Chippewa	0.5		X		0.2	3.9	39.7	44.6	10.3	1.3
	1.2		X		0.1	0.4	36.4	49.6	8.8	4.7
	0.2		X		0.1	5.6	41.2	34.7	13.2	5.2
Zumbro	0.5		X		4.0	30.4	55.8	8.8	1.0	0.0
	5.0	X			2.0	24.8	59.9	7.2	6.1	0.0
Trempealeau	0.3		X		1.4	1.9	29.6	61.3	5.6	0.2

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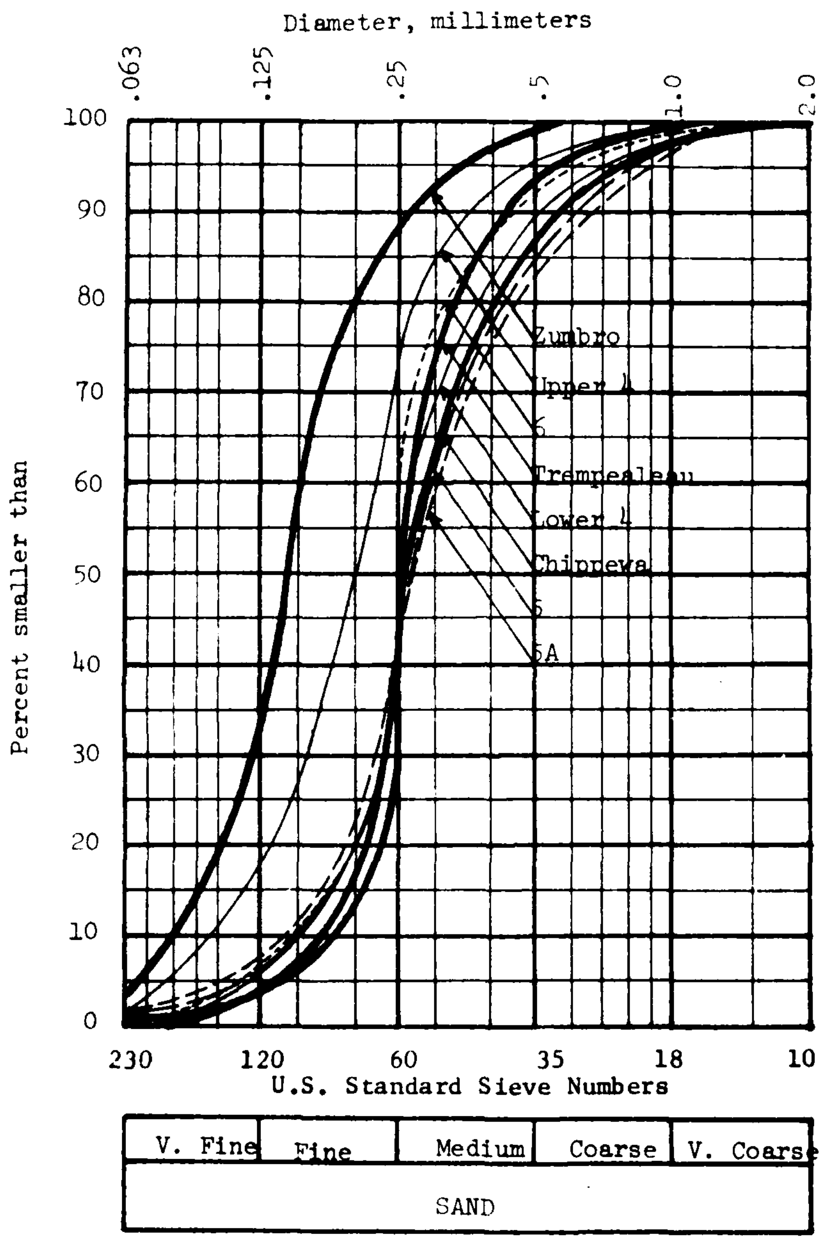
ST. PAUL DISTRICT

EXHIBIT 68 TEXTURES OF SAMPLES FROM TRIBUTARY STREAMS ENTERING POOLS 4, 5, 5A, AND 6

SAMPLE GRADATIONS FOR POOL AND TRIBUTARY
SEDIMENT SAMPLES



ST. PAUL DISTRICT

CORPS OF ENGINEERS

SAMPLE GRADATIONS FOR POOL AND TRIBUTARY
SEDIMENT SAMPLES

EXHIBIT 69

TEXTURAL ANALYSIS AND DESCRIPTION

Item	River			Pool				
	Chippewa	Zumbro	Trempealeau	4 (Above Lk Pepin)	4 (Below Lk Pepin)	5	5A	6
Mean particle diameter	.32mm	.14	.26	.20	.27	.27	.27	.25
Standard deviation	.71 Ø	.65	.45	.50	.69	.57	.85	.53
Classification	Moderately well sorted	Moderately well sorted	Well sorted	Well sorted	Moderately well sorted	Moderately well sorted	Moderately well sorted	Moderately well sorted
Grain shape	NA	NA	NA	Sub-rounded to rounded	More angular than grains from above Pool 4	Angular to sub-angular	Angular to sub-angular	Angular to sub-angular

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EXHIBIT 70

TEXTURAL ANALYSIS AND DESCRIPTION

SAMPLE GRADATION ANALYSIS OF DREDGED MATERIAL AT SELECTED LOCATIONS
ALONG THE MISSISSIPPI RIVER FROM POOL 4 (BELOW LAKE PEPIN) THROUGH POOL 10 (1)

	Pool 4 R.M. 759.0		Pool 5 R.M. 745.1		Pool 5A R.M. 734.?		Average Pools 4 - 5A		Pool 8 R.M. 690.0		Pool 9 R.M. 66[illegible]		Pool 10 R.M. 6[illegible]		Average Pools 8 - 10	
Sieve Size	% Passing	% Retained	% Passing	% Retained	% Passing	% Retained	% Passing	% Retained	% Passing	% Retained	% Passing	% Retained	% Passing	% Retained	% Passing	% Retained
3/4"	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0
#10	93	7	97	3	85	15	92	8	99	1	98	2	98	2	98	2
#20	72	21	86	11	70	15	76	16	95	7	91	7	93	5	93	5
#30	48	24	69	17	56	14	58	18	79	13	77	14	80	13	79	14
#40	16	32	37	32	29	27	28	30	34	45	44	33	36	44	38	41
#200 (2)	0	16	0	37	0	29	0	28	0	34	0	44	0	36	0	38

(1) The samples were taken on dredged spoil sites with varying lengths of time from date of placement. Three samples were taken at each site, one each at top of fill, middle of slope, and toe of slope. The sampling procedures used were designed to give a general indication of the material deposited from dredged rather than a precise description of the material at each site.

(2) It is expected that a small percentage of material would pass the #200 sieve under a more precise gradation analysis.

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SAMPLE GRADATION ANALYSIS OF DREDGED MATERIAL AT SELECTED LOCATIONS ALONG THE MISSISSIPPI RIVER FROM POOL 4 (BELOW LAKE PEPIN) THROUGH POOL 10

EXHIBIT 71

PETROLOGIC COMPARISON OF SAND SAMPLES FROM POOLS AND TRIBUTARIES

Sample Location	Mile	Percent				
		Ign. & Met.	Quartz	Carbonates	Shale	Misc.
Zumbro River	0.5	17.6	75.4	2.3	0.0	4.7
Chippewa River	1.2	30.9	63.3	0.0	0.0	5.8
Pool 4 (Below Lake Pepin)	761.9	40.8	55.2	0.0	0.0	4.0
Pool 5	741.8	35.7	59.4	1.2	0.0	3.7
Pool 6	718.8	35.0	62.0	1.0	0.0	2.0
Chippewa River Terrace	--	47.8	48.0	1.0	0.0	3.2

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EXHIBIT 72

PETROLOGIC COMPARISON OF SAND SAMPLES FROM POOLS AND TRIBUTARIES

CHIPPEWA RIVER BANK EROSION

The Chippewa River undercutting a glacial terrace several miles upstream from Durand, Wisconsin. View looking upstream.

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CHIPPEWA RIVER BANK EROSION

EXHIBIT 73

Chippewa River Terrace About 100 Feet High Located Several Miles Upstream From Durand, Wisconsin.

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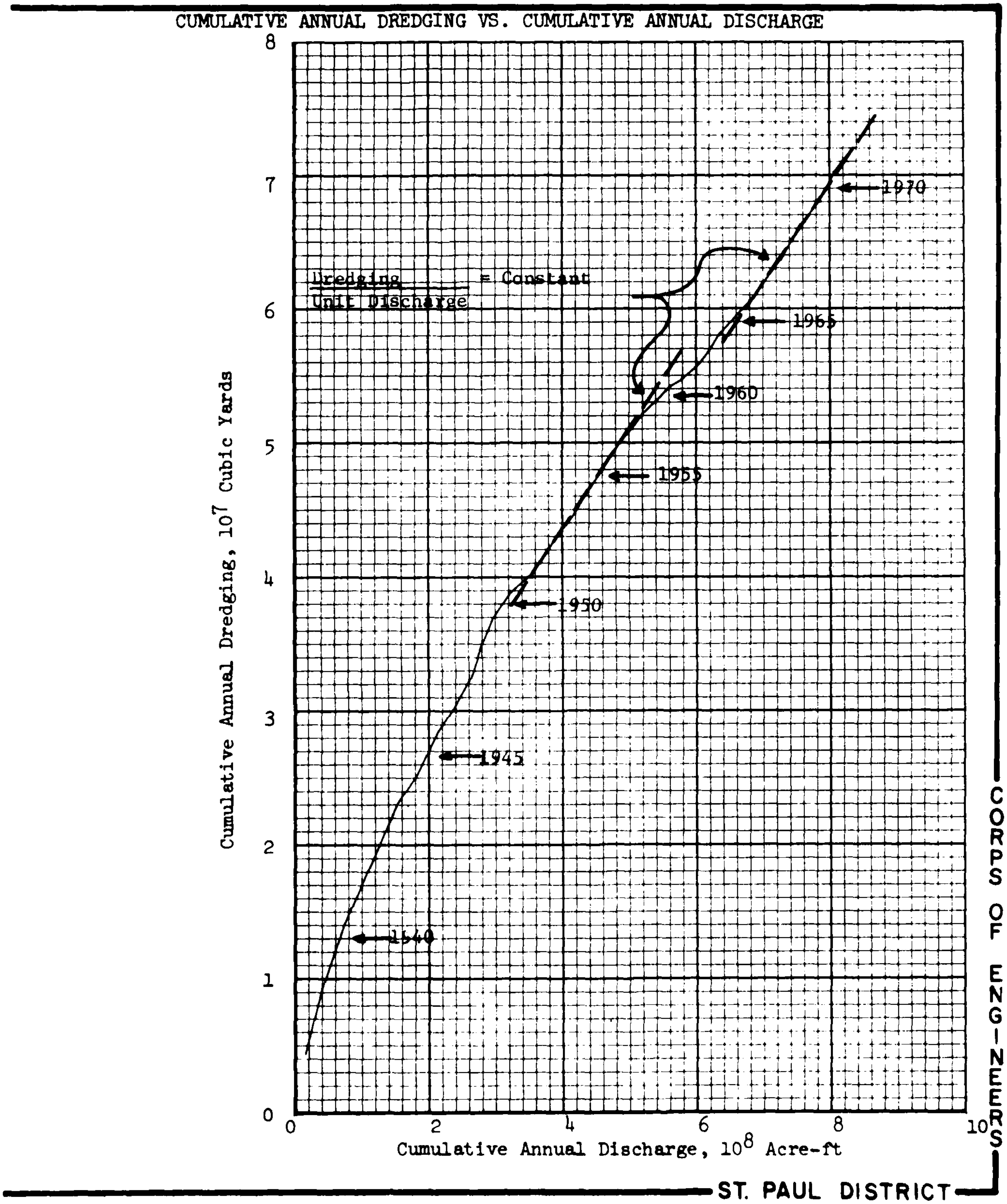
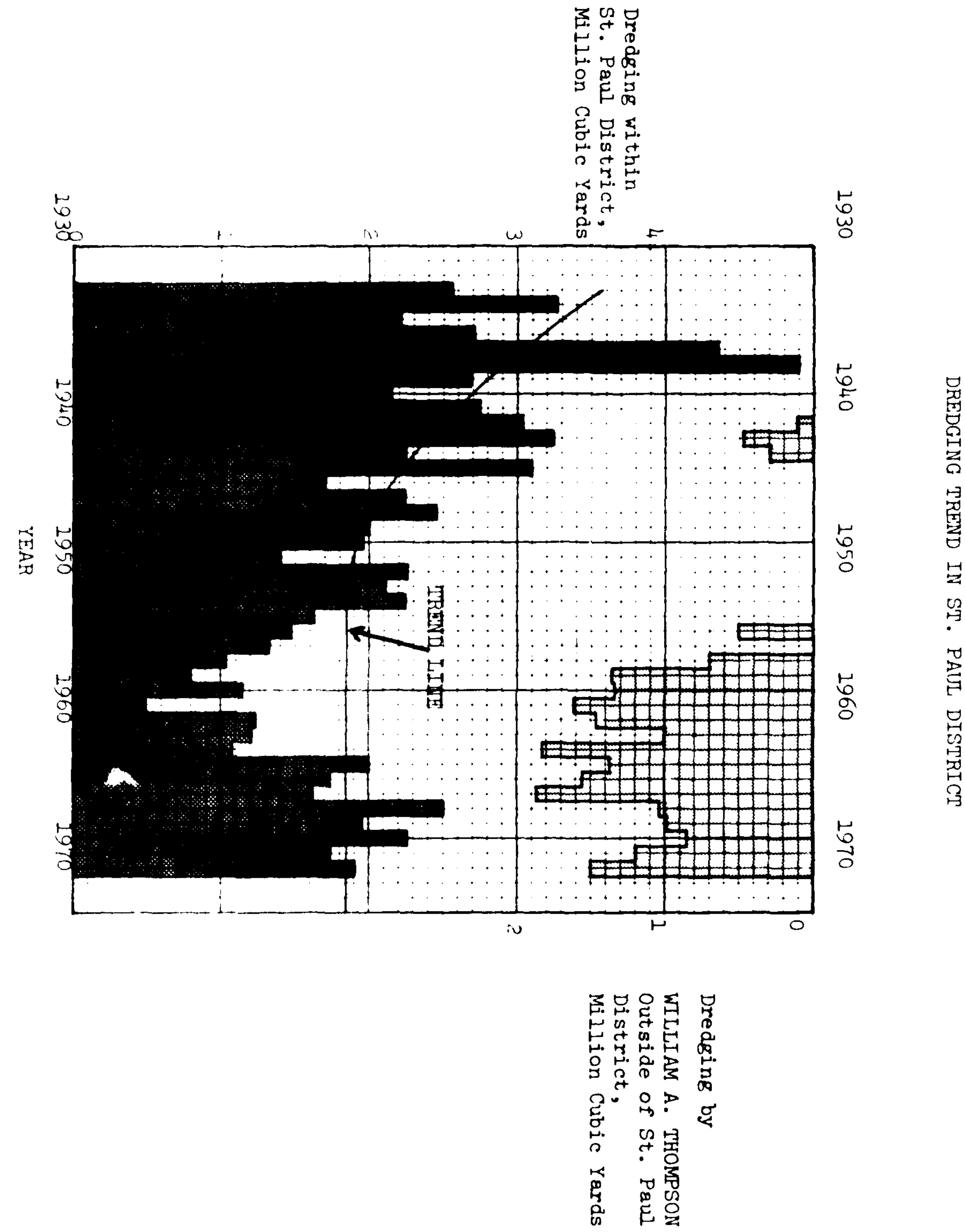
EXHIBIT 74 CHIPPEWA RIVER BEDLOAD SOURCE



CUMULATIVE ANNUAL DREDGING VS. CUMULATIVE ANNUAL DISCHARGE

EXHIBIT 75



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ST. PAUL DISTRICT

EXHIBIT 76 DREDGING TREND IN ST. PAUL DISTRICT

ANIMALS COMMON TO THE DIVERSE ZONES OF VEGETATION FROM
THE RIVER TO THE BLUFF TOP IN THE STUDY AREA

Habitat Types	Species
Deep Marshes	Mallard, muskrat, mink, otter, blue-winged teal, grebes, coot, marsh birds, blackbirds, rails, herons, black terns, snakes, turtles, and frogs.
Shallow Marshes	Migrating ducks, pheasant, muskrat, mink, otter, deer, grebes, coot, blue-winged teal, nesting mallard, frogs, toads, snakes, and other amphibians and reptiles.
Wet Meadows	Deer, red fox, nesting waterfowl, marsh songbirds, herons, pheasant, snakes, leopard frogs, and salamanders and other reptiles and amphibians.
Mud Flats and Sandy Shores	Deer, small mammals, songbirds, nesting ducks, marsh and shore birds.
Wooded and Shrub Swamps	Beaver, mink, raccoon, woodcock, marsh and songbirds, spring peeper, swamp tree frogs, nesting wood duck, herons, deer, small rodents, and shrews.
River Bottom Forests	Raccoon, green frogs, upland game birds, white-tailed deer, cottontail rabbits, wood ducks, forest songbirds, gray fox, salamanders, snakes, and turtles.
Upland Hardwoods	Gray fox, red fox, and flying squirrel, raccoons, white-tail deer, Salamanders, wood frogs, ruffed grouse, gray fox, snakes - include pilot black snake, brown snake, red-bellied snake.
Dry Oak, Savanna and Dry Uplands	Pheasant, deer, ruffed grouse, spotted and striped skunk, wood chucks, prairie skunks, red fox, and snakes.
Brush Prairie	Some prairie songbirds: Horned lark, bobolink, vesper sparrow, lark sparrow, killdeer.
Prairie Grassland	Striped and Franklin ground squirrels, hog-nosed snakes, upland plover, badger, white-tailed jack rabbit, Hungarian partridge.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

ANIMALS COMMON TO THE DIVERSE ZONES OF VEGETATION FROM
THE RIVER TO THE BLUFF TOP IN THE STUDY AREA EXHIBIT 77

AVERAGE TREE COMPOSITION OF SOUTHERN WISCONSIN UPLAND XERIC FOREST, IMPORTANCE VALUE, AND PERCENT CONSTANCY*(J. T. CURTIS, 1959)

Species	Common Name	Average Importance Value (1)	Constancy (2)
Quercus alba	White oak	80.3	88
Q. borealis	Northern red oak	21.7	54
Q. velutina	Black oak	98.3	92
Tilia americana	Basswood	0.8	10
Prunus serotina	Black cherry	23.2	86
Quercus macrocarpa	Burr oak	25.6	64
Acer saccharum	Silver maple	0.2	2
Ulmus rubra	Red elm	3.8	20
Carya ovata	Shagbark hickory	8.2	53
Fraxinus americana	White ash	1.2	10
Quercus ellipsoidalis	Northern pin oak	10.6	10
Populus grandidentata	Cottonwood	1.3	18
Ostrya virginiana	Eastern hophornbeam	0.6	10
Ulmus americana	American elm	3.7	24
Acer rubrum	Red maple	1.5	14
Carya cordiformis	Bitternut hickory	2.1	16
Juglans nigra	Black walnut	2.7	34
J. cinerea	Butternut	0.2	6
Quercus muhlenbergii	Chinkapin oak	2.6	2
Acer negundo	Boxelder	1.8	10
Populus tremuloides	Trembling aspen	18.0	16
Betula papyrifera	Paper birch	0.4	8
Fraxinus pennsylvanica	Green ash	0.6	2
Fagus grandifolia	Beech	....	..
Ulmus thomasi	Rock elm	....	..
Celtis occidentalis	Common hackberry	0.2	2
Quercus bicolor	Swamp white oak	....	..
Fraxinus nigra	Black ash	....	..
Betula lutea	Yellow birch	....	..

*The vegetation of Wisconsin, University of Wisconsin Press.

(1) A measure of the significance of a plant in a stand or a community, expressed as the total of its values for relative density, relative frequency, and relative dominance, with a possible range from 0-300.

(2) The degree to which a species occurs in separate stands in a community, based on a single fixed area sample and expressed as a percentage of occurrence.

EXHIBIT 78

AVERAGE TREE COMPOSITION OF SOUTHERN WISCONSIN UPLAND XERIC FOREST, IMPORTANCE VALUE, AND PERCENT CONSTANCY

PREVALENT UPLAND GROUNDLAYER SPECIES, SOUTHERN WISCONSIN,
PERCENT PRESENCE, AND AVERAGE FREQUENCY *(J. T. CURTIS, 1959)

Species	Common Name	Presence (1) (percent)	Average Frequency(2) (percent)
Adiantum pedantum	Maidenhair fern	81	6.9
Agrimonia gryposepala	Agrimony	43	1.0
Amphicarpa bracteata	Hog-peanut	94	21.6
Anemone quinquefolia	Wood anemone	65	6.2
A. virginiana	Thimbleweed	41	0.8
Apocynum androsaemifolium	Dogbane	52	2.6
Aralia nudicaulis	Wild sassasparilla	76	11.9
A. racemosa	Spikenard	61	1.2
Ariseama triphyllum	Swamp Jack-in-the-pulpit	81	17.2
Aster saggitfolius	Arrow-leafed aster	54	3.9
A. shortii	Short's aster	61	4.7
Athyrium filix-femina	Lady fern	74	7.6
Botrychium virginianum	Rattlesnake-fern	83	6.3
Brachyelytrum erectum	Grass	67	7.2
Carex pennsylvanica	Sedge	78	14.4
Caulophyllum thalictroides	Blue cohosh	65	3.3
Celastrus scandens	Bittersweet	67	7.8
Cornus alternifolia	Alternate leaved dogwood	48	1.6
C. racemosa	Grey dogwood	79	11.5
C. rugosa	Roundleaf dogwood	43	2.2
Corylus americana	American hazelnut	82	10.7
Cryptoteania canadensis	Honewort	59	5.4
Desmodium glutinosum	Pointed-leaved tick-trefoil	93	7.9
Dioscorea villosa	Wild yam	57	2.7
Fragaria virginiana	Strawberry	57	4.1
Galium aparine	Spring-cleavers	50	10.1
G. concinnum	Bedstraw, cleavers	93	26.0
G. triflorum	Sweet-scented bedstraw	50	4.3
Geranium maculatum	Wild geranium	100	35.8
Geum canadense	White avens	50	6.4
Helianthus strumosus	Pale-leaved wood sunflower	63	6.7
Hydrophyllum virginanum	John's cabbage	44	5.5
Hystrix patula	Bottle-brush grass	67	2.6
Lactuca spicata	Lettuce	52	2.0
Lonicera prolifera	Rock honeysuckle	57	3.6
Osmorhiza claytoniana	Sweet cicely	46	3.9
Parietaria pennsylvanica	Pellitory	43	4.6

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PREVALENT UPLAND GROUNDLAYER SPECIES, SOUTHERN WISCONSIN
PERCENT PRESENCE, AND AVERAGE FREQUENCY EXHIBIT 79

PREVALENT UPLAND GROUNDLAYER SPECIES, SOUTHERN WISCONSIN (continued)

Species	Common Name	Presence (percent)	Average Frequency (percent)
Osmunda claytoniana	Interrupted fern	46	3.9
Parthenocissus vitacea	Woodbine	85	23.9
Phryma leptostachya	Lopseed	83	6.9
Podophyllum peltatum	May-apple	70	15.0
Polygonatum pubescens	Hairy Solomon's seal	44	4.7
Prenanthes alba	Rattlesnake-root	80	4.0
Pteridium aquilinum	Brachen fern	54	9.0
Ranunculus abortivus	Kidneyleaf buttercup	48	2.6
Rhus radicans	Poison ivy	72	9.8
Ribes cynosbati	Pasture gooseberry	74	3.6
Rosa sp.	Rose	56	1.6
Rubus allegheniensis	Black raspberry	52	7.9
Rubus strigosus	Red raspberry	48	9.5
Sambucus canadensis	Common elder	44	0.8
Sanguinaria canadensis	Bloodroot	65	12.8
Sanicula gregaria	Black snakeroot	83	15.1
Smilacina racemosa	False Solomon's seal	98	25.8
Smilax ecirrhata	Carrion-flower	72	2.6
Smilax herbacea	Greenbrier	61	2.1
Solidago ulmifolia	Goldenrod	59	6.8
Thalictrum dioicum	Early meadow-rue	72	9.4
Triosteum perfoliatum	Tinker's weed	52	1.0
Uvularia grandiflora	Bellwort	93	16.6
Veronicastrum virginicum	Culver's root	48	1.5
Viola cucullata	Marsh blue violet	70	11.1
Viola pubescens	Downy yellow violet	59	12.9
Vitis aestivalis	Summer grape	69	4.5
Zanthosylum americanum	Prickly ash	48	4.4

*The vegetation of Wisconsin, University of Wisconsin Press.

(1) Presence - The degree to which a species occurs in separate stands of a community based on the entire stand as the sample, expressed as a percentage of the total stands examined.

(2) Frequency - The ratio of occupied samples to total samples examined within a stand, on a percentage basis.

AVERAGE TREE COMPOSITION, SOUTHERN WISCONSIN WET LOWLAND FOREST, IMPORTANCE VALUE, AND PERCENT CONSTANCY *(J. T. CURTIS, 1959)

Species	Common Name	Average Importance Value (1)	Constancy (2) (percent)
Acer saccharinium	Silver maple	81.6	81.5
Ulmus americana	American elm	26.5	66.7
Salix nigra	Black willow	64.0	70.3
Populus deltoides	Cottonwood	54.5	70.4
Fraxinus pennsylvanica	Green ash	8.2	51.9
Betula nigra	River birch, red birch	24.4	51.8
Quercus bicolor	Swamp white oak	15.2	29.6
Tilia americana	Basswood	1.6	11.1
Fraxinus nigra	Black ash	2.9	18.5
Quercus borealis	Northern red oak	0.3	3.7
Fraxinus americana	White ash	0.8	11.1
Quercus microcarpa	Burr oak	5.8	3.7
Ulmus rubra	Red elm	0.8	3.7
Carya ovata	Shagbark hickory	0.2	3.7
Quercus alba	White oak	0.2	3.7
Q. velutina	Black oak	3.6	3.7
Acer negundo	Box elder	3.0	22.2
Carya cordiformis	Bitternut hickory	0.4	7.4
Prunus serotina	Black cherry	0.7	3.7
Populus tremuloides	Trembling aspen	0.2	3.7
Salix amygdaloides	Peach-leaved willow	0.2	3.7

*The vegetation of Wisconsin, University of Wisconsin Press.

(1) A measure of the significance of a plant in a stand or a community, expressed as the total of its values for relative density, relative frequency, and relative dominance, with a possible range from 0-300.

(2) The degree to which a species occurs in separate stands in a community, based on a single fixed area sample and expressed as a percentage of occurrence.

AVERAGE TREE COMPOSITION, SOUTHERN WISCONSIN WET LOWLAND FOREST, IMPORTANCE VALUE, AND PERCENT CONSTANCY

EXHIBIT 80

PREVALENT LOWLAND GROUNDLAYER SPECIES, SOUTHERN WISCONSIN, PERCENT, PRESENCE, AND AVERAGE FREQUENCY *(J.T. CURTIS, 1959)

Species	Common Name	Presence (percent)	Average Frequency (percent)
Amphicarpa bracteata	Hog-peanut	34	10.1
Arenaria lateriflora	Grove sandwort	34	9.0
Arisaema triphyllum	Swamp jack-in-the-pulpit	66	17.2
A. dracontium	Green dragon	44	2.5
Aster lateriflorus	Starved aster	41	12.5
Athyrium filix-femina	Lady fern	39	3.8
Boehmeria cylindrica	Balse nettle, bog-hemp	47	7.6
Circaea quadrisulcata	Enchanter's nightshade	34	8.8
Cryptotaenia canadensis	Honewort	45	12.9
Cuscuta gronovii	Dodder	31	3.3
Dioscorea villosa	Wild yam	31	3.3
Elymus virginicus	Terrell grass	39	9.1
Galium triflorum	Fragrant bedstraw	44	6.4
Geum canadense	White avens	61	11.5
Glyceria striata	Fowl meadow grass	41	6.7
Impatiens biflora	Jewel weed	67	21.4
Laportea canadensis	Wood nettle	77	39.7
Leersia virginica	White grass	36	11.8
Lycopus uniflorus	Bugle-weed; water-horehound	36	5.7
Menispermum canadense	Moonseed	34	4.8
Onoclea sensibilis	Sensitive fern	56	6.9
Osmorhiza claytoni	Sweet cicely	33	6.6
Parthenocissus vitacea	Woodbine	80	23.0
Polygonatum pubescens	Hairy Solomon's seal	33	6.2
Ranunculus abortivus	Kidneyleaf buttercup	47	5.0
Rhus radicans	Poison ivy	59	6.7
Ribes americanum	American black currant	48	6.8
Sambucus canadensis	Common elder	42	3.2
Sanicula gregaria	Black snakeroot	36	13.1
Smilacina stellata	Starry false Solomon's seal	34	5.5
Smilax ecirrhata	Carrion-flower	41	4.7
S. herbacea	Carrion-flower	41	2.0
Solanum dulcamara	Swamp nightshade	39	4.2
Solidago gigantea	Giant goldenrod	34	6.3
Steironema ciliatum	Loostrife	57	10.2
Viola cucullata	Marsh blue violet	63	16.3
V. pubescens	Downy yellow violet	36	11.2
Vitis riparia	Riverbank grape	58	3.4
Zanthoxylum americanum	Prickly ash	36	3.9

*The Vegetation of Wisconsin, University of Wisconsin Press.
(1)-(2) - Definitions as in EXHIBIT 79.

EXHIBIT 81 PREVALENT LOWLAND GROUNDLAYER SPECIES, SOUTHERN WISCONSIN, PERCENT, PRESENCE, AND AVERAGE FREQUENCY

AQUATIC MACROPHYTES IN POOL #3

Family	Genus and Species	Family	Genus and Species
Alismataciac (Water plantains)	Sagitaria latifolia (arrowhead)	Najadaceae (pondweed)	Potamogeton pectinatus Potamogeton crispus
Butomaceae (Flowering rushes)	Anacharis (Waterweed, Elodea) Vallisneria americana	Polygonaceae (pondweed)	Polygonum natans
Gramineae (Grasses)	Zizania aquatica (wild rice)	Salicaceae (Willows)	Salix spp. (Willow)
Cyperaceae (Sedges)	Eleocharis spp. Scirpus spp.	Typhaceae (Cattails)	Typha latifolia (Cattail)
Lemnaceae (Duckweed)	Lemna minor Spirodella polyrhiza Wolffia punctata		

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EXHIBIT 82

MARSH AND AQUATIC PLANTS IN POOLS 4 - 9
*(W. F. GREEN, 1947)

Marsh Plants	%	Aquatic Plants	%
Zizania Wild rice, water oats	1	*Potamogeton americanus* Pondweed	17
Leersia Cutgrasses	1	*Potamogeton pectinatus* Sago	6
Echinochloa Barnyard grasses	.25	*Potamogeton foliosus* Pondweed	6
Phalaris Canary grasses	1	*Potamogeton zosteriformis* Flat-stemmed pondweed	.5
Phragmites Grasses	5	*Potamogeton crispus* Curly-leaved pondweed	1
Other *Graminae* Grasses	2	*Potamogeton richardsonii* Red-head pondweed	Trace
Scirpus fluviatilis River bulrush	28	*Potamogeton epihydrus* Leafy pondweed	Trace
Scirpus validus Great or soft-stem bulrush	3	*Heteranthra dubia* Water stargrass	3
Eleocharis Spikerushes	Trace	*Vallisneria spiralis* Wild or water-celery	Trace
Carex Sedges	2	*Nitella* Fennel flower	Trace
Sparganium Bur-reeds	7	*Najas* Naiads	2
Sagittaria Arrowheads, swamp-potatoes	47	*Zannichellia* Horned-pondweeds	Trace
Typha Cat-tail flag reed-mace	Trace	*Elodea* Waterweeds	13
Polygonum pennsylvanicum Large-seeded smart weed	Trace	*Lemnaceae* Duckweeds	7
Polygonum muhlenbergii Smart weed	Trace	*Ceratophyllum* Hornworts	21
Polygonum spp. Smartweeds	1	*Myriophyllum* Water-milfoils	Trace
Pontederia Pickerel weeds	Trace	*Utricularia* Bladderworts	Trace
Rumex Dock, sorrel	Trace	*Ranunculus* Buttercups	-
Compositae Composites, daisies	2	*Nelumbo* Sacred beans	18
Castalia Water lilies	Trace	*Nymphaea* Water lilies	3
Algae Algae	1		

*Distribution of Marsh and Aquatic Plants on the Upper Mississippi River Wildlife Refuge, Bureau Sport Fisheries and Wildlife, Winona, Minnesota.

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ST. PAUL DISTRICT

EXHIBIT 83

MARSH AND AQUATIC PLANTS IN POOLS 4 - 9

CHECK LIST OF MAMMALS FOUND IN THE UPPER MISSISSIPPI
RIVER WILD LIFE AND FISH REFUGE

Common Name	Scientific Name	Abundance
Virginia Opossum	Didelphis marsupialis	Common
Masked Shrew	Sorex cinereus	Common
Shorttail Shrew	Blarina brevicauda	Common
Least Shrew	Cryptotis parva	Common
Eastern Mole	Scalopus aquaticus	Common
Starnose Mole	Condylura cristata	Rare
Little Brown Bat	Myotis lucifugus	Common
Keen's Bat	Myotis keenii	Common
Eastern Pipistrel	Pipistrellus subflavus	Uncommon
Big Brown Bat	Eptesicus fuscus	Common
Red Bat	Lasiurus borealis	Common
Hoary Bat	Lasiurus cinereus	Rare
Whitetail Jack Rabbit	Lepus townsendii	Rare
Eastern Cottontail	Sylvilagus floridanus	Common
Woodchuck	Marmota monax	Common
Thirteen-Lined Ground Squirrel	Citellus tridecemlineatus	Common
Franklin Ground Squirrel	Citellus franklinii	Rare
Eastern Chipmunk	Tamias striatus	Common
Eastern Gray Squirrel	Sciurus carolinensis	Common
Eastern Fox Squirrel	Sciurus niger	Common
Red Squirrel	Tamiasciusus hudsonicus	Occasional
Southern Flying Squirrel	Glaucomys volans	Occasional
Plains Pocket Gopher	Geomys bursarius	Occasional
Beaver	Castor canadensis	Common
Western Harvest Mouse	Reithrodontomys megalotis	Uncommon
Deer Mouse	Peromyscus maniculatus	Common
White-Footed Mouse	Peromyscus leucopus	Common
Southern Bog Lemming	Synaptomys cooperi	Common
Meadow Vole	Microtus pennsylvanicus	Common
Prairie Vole	Pedomys ochrogaster	Common
Pine Vole	Pitymys pinetorum	Occasional
Muskrat	Ondatra zibethicus	Common
Norway Rat	Rattus norvegicus	Common
House Mouse	Mus musculus	Common

CHECK LIST OF MAMMALS FOUND IN THE UPPER MISSISSIPPI
RIVER WILD LIFE AND FISH REFUGE

EXHIBIT 84

MAMMALS FOUND IN THE UPPER MISSISSIPPI (continued)

Common Name	Scientific Name	Abundance
Meadow Jumping Mouse	Zapus hudsonius	Common
Nutria	Myocaster coypus	Rare
Coyote	Canis latrans	Occasional
Red Fox	Vulpes fulva	Common
Gray Fox	Urocyon cinereoargenteus	Occasional
Raccoon	Procyon lotor	Common
Least Weasel	Mustela rixosa	Uncommon
Mink	Mustela vison	Erratic
Badger	Taxidea taxus	Uncommon
Spotted Skunk	Spilogale putorius	Occasional
Striped Skunk	Mephitis mephitis	Common
River Otter	Lutra canadensis	Common
Lynx	Lynx canadensis	Rare
Bobcat	Lynx rufus	Rare
White-tailed Deer	Odocoileus virginianus	Common
Additional Recent Species		
Moose	Alces alces	Rare
Blackbear	Ursus americanas	Rare
Longtailed weasel	Mustela frenata	Uncommon
Porcupine(1)	Erethizon dorsatum	Uncommon
Snowshoe hare(1)	Lepus americanus	Uncommon

(1) Most likely to occur north of the Upper Mississippi Wildlife and Fish Refuge but probably present in the Project Area.

BIRDS REPORTED IN THE TWIN CITY AREA

Common Name	Common Name
Loon	Cooper's Hawk
Red-throated Loon	Red-tailed Hawk
Holboell's Grebe	Red-shouldered Hawk
Horned Grebe	Broad-winged Hawk
Eared Grebe	Rough-legged Hawk
Pied-billed Grebe	Ferruginous Rough-leg
White Pelican	Golden Eagle
Double-crested Cormorant	Bald Eagle
Great Blue Heron	Marsh Hawk
American Egret	Osprey
Green Heron	Gyrfalcon
Blue-crested Night Heron	Duck Hawk
American Bittern	Pigeon Hawk
Least Bittern	Sparrow Hawk
Whistling Swan	Ruffed Grouse
Canada Goose	Prairie Chicken
White-fronted Goose	Sharp-tailed Grouse
Snow-blue Goose	European Partridge
Black Duck	Ring-necked Pheasant
Mallard	Bobwhite
Gadwall	Sandhill Crane
Baldpate	King Rail
American Pintail	Virginia Rail
Green-winged Teal	Sora
Blue-winged Teal	Yellow Rail
Cinnamon Teal	Florida Gallinule
Shoveler	Coot
Wood Duck	Piping Plover
Red Head	Semipalmated Plover
Ring-necked Duck	Killdeer
Canvasback	Golden Plover
Lesser Scaup Duck	Black-bellied Plover
Greater Scaup Duck	Ruddy Turnstone
Golden-eye	Woodcock
Barrow's Golden eye	Wilson's Snipe
Bufflehead	Upland Plover
Old Squaw	Spotted Sandpiper
White-winged Scoter	Solitary Sandpiper
Surf Scoter	Western Willet

CORPS OF ENGINEERS

ST. PAUL DISTRICT

BIRDS REPORTED IN THE TWIN CITY AREA (continued)

Common Name	Common Name
American Scoter	Greater Yellow-legs
Ruddy Duck	Lesser Yellow-legs
Hooded Merganser	Knot
American Merganser	Pectoral Sandpiper
Redbreasted Merganser	White-rumped Sandpiper
Turkey Vulture	Baird's Sandpiper
Swallowtailed Kite	Least Sandpiper
Goshawk	Red-backed Sandpiper
Sharp-shinned Hawk	Dowitcher
Stilt Sandpiper	Yellow-bellied Flycatcher
Semipalmated Sandpiper	Alder Flycatcher
Buff-breasted Sandpiper	Least Flycatcher
Marbled Godwit	Wood Pewee
Hudsonian Godwit	Olive-sided Flycatcher
Sanderling	Horned Lark
Avocet	Tree Swallow
Wilson's Phalarope	Bank Swallow
Northern Phalarope	Rough-winged Swallow
Herring Gull	Barn Swallow
Ring-billed Gull	Cliff Swallow
Franklin's Gull	Purple Martin
Bonaparte's Gull	Canada Jay
Forster's Tern	Blue Jay
Common Tern	Magpie
Least Tern	Raven
Caspian Tern	Crow
Black Tern	Black-capped Chickadee
Mourning Dove	Hudsonian Chickadee
Rock Dove	Tufted Titmouse
Yellow-billed Cuckoo	Whitebreasted Nuthatch
Black-billed Cuckoo	Redbreasted Nuthatch
Screech Owl	Brown Creeper
Great Horned Owl	House Wren
Snowy Owl	Winter Wren
Hawk Owl	Bewick's Wren
Barred Owl	Carolina Wren
Great Gray Owl	Long-billed Marsh Wren
Long-eared Owl	Short-billed Marsh Wren
Short-eared Owl	Mockingbird
Saw-Whet Owl	Cat Bird
Whippoorwill	Brown Thrasher

BIRDS REPORTED IN THE TWIN CITY AREA (continued)

Common Name	Common Name
Nighthawk	Robin
Chimney Swift	Wood Thrush
Rubythroated Hummingbird	Hermit Thrush
Belted Kingfisher	Olive-backed Thrush
Flicker	Gray-cheeked Thrush
Pileated Woodpecker	Veery
Red-bellied Woodpecker	Bluebird
Redheaded Woodpecker	Townsend's Solitaire
Yellow-bellied Sapsucker	Blue-gray Gnatcatcher
Hairy Woodpecker	Golden-crowned Kinglet
Downy Woodpecker	Ruby-crowned Kinglet
Arctic 3-toed Woodpecker	American Pipit
King Bird	Bohemian Waxwing
Western Kingbird	Cedar Waxwing
Crested Flycatcher	Northern Shrike
Phoebe	Migrant Shrike
Starling	Baltimore Oriole
Bell's Vireo	Rusty Blackbird
Yellowthroated Vireo	Brewer's Blackbird
Blueheaded Vireo	Bronzed Grackle
Redeyed Vireo	Cowbird
Philadelphia Vireo	Scarlet Tanager
Warbling Vireo	Cardinal
Black and White Warbler	Rosebreasted Grosbeak
Prothonotary Warbler	Indigo Bunting
Worm-eating Warbler	Dickcissel
Golden-winged Warbler	Evening Grosbeak
Blue-winged Warbler	Purple Finch
Tennessee Warbler	Pine Grosbeak
Orange-crowned Warbler	Hoary Redpoll
Nashville Warbler	Redpoll
Parula Warbler	Pine Siskin
Yellow Warbler	Goldfinch
Magnolia Warbler	Red Crossbill
Camp May Warbler	White-winged Crossbill
Blackthroated Blue Warbler	Towhee
Myrtle Warbler	Savannah Sparrow
Audobon's Warbler	Grasshopper Sparrow
Blackthroated Green Warbler	Leconte's Sparrow

BIRDS REPORTED IN THE TWIN CITY AREA (continued)

Common Name	Common Name
Cerulean Warbler	Henslow's Sparrow
Blackburnian Warbler	Nelson's Sparrow
Hooded Warbler	Vesper Sparrow
Chestnut-sided Warbler	Lark Sparrow
Bay-breasted Warbler	Slate-colored Junco
Blackpoll Warbler	Oregon Junco
Pine Warbler	Tree Sparrow
Palm Warbler	Chipping Sparrow
Ovenbird	Clay-colored Sparrow
Northern Water-Thrush	Field Sparrow
Louisiana Water-Thrush	Harris' Sparrow
Connecticut Warbler	White-crowned Sparrow
Mourning Warbler	White-throated Sparrow
Yellowthroat	Fox Sparrow
Yellowbreasted Chat	Lincoln's Sparrow
Wilson's Warbler	Swamp Sparrow
Canada Warbler	Song Sparrow
Redstart	Lapland Longspur
English Sparrow	Snow Bunting
Bobolink	Western Grebe
Eastern Meadowlark	Yellow Night Heron
Western Meadowlark	Western Tanager
Yellow-headed Blackbird	Red-winged Blackbird
Orchard Oriole	

BIRD ABUNDANCE IN THE RIVER VALLEYS IN THE TWIN CITIES
AREA BASED UPON CASUAL OBSERVATIONS, 1973

Bird Species	Flood Plain Lakes Minn R.	Flood Plain Lakes Pool 2	SAF Pools	Pool 1	Pool 2	Minn R.	St. Cx.R.	Total Indiv
Great Blue Heron	75	29			13	84		201
Common Egret	19	86			8	4		117
American Bittern	3							3
Mallard	25	25	90	1	5	20		166
Coot	48	6						54
Wood Duck	9	15	18		2	17		61
Pheasant			1					1
Woodpecker			2			1		3
Yellow-shafted Flicker			3					3
Grackle			2			1		3
Sparrow			1					1
Whitethroated Sparrow			1					1
Spotted Sandpiper			1			19		20
Bank Swallow						3		3
Belted Kingfisher		1			8	22		31
Black Tern						3		3
Teal						2		2
Black Duck						1		1
Hooded Merganser						1		1
Pied-billed Grebe			1					1
Barn Swallow			1					1
Osprey		1				2		3
Redtailed Hawk	1							1
Green Heron		1			2	38		41
Crow						12		12
Blackcrowned Night Heron					8			8
Common Tern		12						12
Canada Goose			10			7		17
TOTAL EACH POOL	180	176	130	1	47	237	0	771

BIRD ABUNDANCE IN THE RIVER VALLEYS IN THE TWIN CITIES
AREA BASED UPON CASUAL OBSERVATIONS, 1973

EXHIBIT 86

CHECKLIST OF BIRDS OBSERVED IN THE
LOWER KINNICKINNIC RIVER VALLEY

Common Name	Common Name
Common Loon	Great Horned Owl
Pied-billed Grebe	Barred Owl
Great Blue Heron	Nighthawk
Green Heron	Whippoorwill
Common (American) Egret	Chimney Swift
American Bittern	Rubythroated Hummingbird
Canadian Goose	Belted Kingfisher
Blue Goose	Flicker
Mallard	Pileated Woodpecker
Gadwall	Red-bellied Woodpecker
Pintail	Redheaded Woodpecker
Green-wing Teal	Yellow-bellied Sapsucker
Blue-wing Teal	Hairy Woodpecker
American Widgeon (Baldplate)	Downy Woodpecker
Shoveler	Eastern Kingbird
Wood Duck	Crested Flycatcher
Ring-necked Duck	Eastern Phoebe
Greater Scaup	Yellow-bellied Flycatcher
Lesser Scaup	Alder Flycatcher
Common (American) Goldeneye	Least Flycatcher
Bufflehead	Eastern Wood Pewee
Hooded Merganser	Tree Swallow
Common (American) Merganser	Bank Swallow
Redbreasted Merganser	Rough-winged Swallow
Turkey Vulture	Barn Swallow
Sharp-skinned Hawk	Cliff Swallow
Cooper's Hawk	Purple Martin
Red-tailed Hawk	Blue Jay
Red-shouldered Hawk	Crow
Broad-winged Hawk	Black-capped Chickadee
Bald Eagle	White-breasted Nuthatch
Marsh Hawk	Brown Creeper
Osprey	House Wren
Pigeon Hawk	Winter Wren
Sparrow Hawk	Catbird
Ruffed Grouse	Brown Thrasher
Ring-necked Pheasant	Robin
Coot	Wood Thrush

EXHIBIT 87 CHECKLIST OF BIRDS OBSERVED IN THE
LOWER KINNICKINNIC RIVER VALLEY

CHECKLIST OF BIRDS IN THE LOWER KINNICKINNIC RIVER VALLEY (continued)

Common Name	Common Name
Killdeer	Hermit Thrush
Common (Wilson's) Snipe	Swainson's (Olive-backed) Thrush
Spotted Sandpiper	Gray-checked Thrush
Solitary Sandpiper	Veery
Greater Yellowlegs	Bluebird
Lesser Yellowlegs	Blue-gray Gnatcatcher
Pectoral Sandpiper	Golden-crowned Kinglet
Woodcock	Ruby-crowned Kinglet
Ring-billed Gull	Cedar Waxwing
Herring Gull	Starling
Rock Dove	Yellowthroated Vireo
Mourning Dove	Solitary Vireo
Yellow-billed Cuckoo	Redeyed Vireo
Black-billed Cuckoo	Philadelphia Vireo
Warbling Vireo	Savannah Sparrow
Black and White Warbler	Grasshopper Sparrow
Tennessee Warbler	Vesper Sparrow
Orange-Crowned Warbler	Slate-colored Junco
Nashville Warbler	Tree Sparrow
Yellow Warbler	Chipping Sparrow
Magnolia Warbler	Clay-colored Sparrow
Myrtle Warbler	Field Sparrow
Blackthroated Green Warbler	White-crowned Sparrow
Blackburnian Warbler	Whitethroated Sparrow
Chestnut-sided Warbler	Harris' Sparrow
Baybreasted Warbler	Fox Sparrow
Palm Warbler	Swamp Sparrow
Ovenbird	Song Sparrow
Northern Waterthrush (Grinnell's)	Snow Bunting
Connecticut Warbler	Yellowthroat
Wilson's Warbler	American Redstart
House (English) Sparrow	Bobolink
Eastern Meadowlark	Western Meadowlark
Red-winged Blackbird	Baltimore Oriole
Common Grackle	Brown-headed Cowbird
Scarlet Tanager	Cardinal
Rosebreasted Grosbeak	Indigo Bunting
Dickcissel	Evening Grosbeak
Purple Finch	Pine Siskin
Goldfinch	Towhee

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 87

CHECK LIST OF BIRDS FOUND IN THE UPPER MISSISSIPPI RIVER WILDLIFE AND FISH REFUGE

Common Name	Seasonal Abundance			
	Spring	Summer	Fall	Winter
Common Loon	Rare		Rare	
Red-Necked Grebe	Rare		Rare	
Horned Grebe	Rare		Rare	
Pied-Billed Grebe*	Common	Common	Common	
White Pelican	Occasional		Occasional	
Double-Crested Cormorant*	Common	Common	Common	
Great Blue Heron*	Common	Common	Common	Rare
Green Heron*	Common	Common	Common	
Little Blue Heron		Rare		
Common Egret*	Common	Common	Occasional	
Snowy Egret	Rare	Rare		
Black-Crowned Night Heron*	Common	Common	Common	
YellowCrowned Night Heron*	Uncommon	Uncommon	Uncommon	
Least Bittern*	Occasional	Occasional	Occasional	
American Bittern*	Common	Common	Common	
Whistling Swan	Common		Common	
Canada Goose*	Common	Occasional	Common	Occasional
White-Fronted Goose	Rare		Rare	
Snow Goose	Common		Common	
Blue Goose	Common		Common	
Mallard*	Abundant	Common	Abundant	Common
Black Duck*	Common	Occasional	Common	Occasional
Cadwall	Common		Common	
Pintail	Abundant	Rare	Abundant	Rare
Green-Winged Teal*	Common	Rare	Common	Rare
Blue-Winged Teal*	Abundant	Uncommon	Abundant	
American Widgeon	Abundant		Abundant	
Shoveler	Common		Common	
Wood Duck*	Common	Common	Common	
Redhead	Common	Occasional	Common	Rare
Ring-Necked Duck	Abundant		Abundant	Rare
Canvasback	Common		Common	Rare
Greater Scaup	Uncommon		Uncommon	

EXHIBIT 88 CHECKLIST OF BIRDS FOUND IN THE UPPER MISSISSIPPI RIVER WILDLIFE AND FISH REFUGE

CHECK LIST OF BIRDS (continued)

Common Name	Seasonal Abundance			
	Spring	Summer	Fall	Winter
Lesser Scaup	Abundant	Rare	Abundant	Rare
Common Goldeneye	Common		Common	Occasional
Bufflehead	Occasional		Occasional	Rare
Oldsquaw	Rare		Rare	Rare
White-Winged Scoter	Rare		Rare	Rare
Common Scoter			Rare	Rare
Ruddy Duck	Common	Rare	Common	
Hooded Merganser*	Common	Occasional	Common	Rare
Common Merganser	Common		Common	
Red-Breasted Merganser	Rare		Rare	Rare
Turkey Vulture	Occasional	Occasional	Occasional	Rare
Goshawk				Occasional
Sharp-Shinned Hawk	Uncommon	Uncommon	Uncommon	Occasional
Cooper's Hawk*	Uncommon	Uncommon	Uncommon	Occasional
Red-Tailed Hawk	Common	Common	Common	Common
Red-Shouldered Hawk	Occasional	Occasional	Occasional	Uncommon
Broad-Winged Hawk*	Occasional	Occasional		
Rough-Legged Hawk			Occasional	Occasional
Golden Eagle	Rare		Rare	Rare
Bald Eagle*	Occasional	Occasional	Occasional	Common
Marsh Hawk*	Common	Common	Common	Occasional
Osprey	Occasional	Occasional	Occasional	Occasional
Peregrine Falcon*	Rare	Rare	Rare	
Pigeon Hawk	Rare		Rare	
Sparrow Hawk	Occasional	Occasional	Occasional	Rare
Ruffed Grouse*	Common	Common	Common	Common
Greater Prairie Chicken				Rare
Sharp-Tailed Grouse				Rare
Bobwhite*	Occasional	Occasional	Occasional	Occasional
Ring-Necked Pheasant*	Common	Common	Common	Common
Gray Partridge	Occasional	Occasional	Occasional	Occasional
King Rail*	Uncommon	Uncommon		
Virginia Rail*	Uncommon	Uncommon	Occasional	
Sora*	Abundant	Abundant	Common	
Common Gallinule*	Rare	Rare		
American Coot*	Abundant	Common	Abundant	Rare
Semipalmated Plover	Common	Occasional	Common	
Killdeer*	Common	Common	Common	Rare

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 88

CHECK LIST OF BIRDS (continued)

Common Name	Seasonal Abundance			
	Spring	Summer	Fall	Winter
American Golden Plover	Occasional		Uncommon	
Black-Bellied Plover	Occasional		Occasional	
Ruddy Turnstone	Rare			
American Woodcock	Rare	Rare	Rare	
Common Snipe	Common	Occasional	Common	Rare
Long-Billed Curlew			Rare	
Upland Plover	Occasional	Occasional		
Spotted Sandpiper*	Common	Common	Common	
Solitary Sandpiper	Common		Common	
Willet	Rare		Rare	
Greater Yellowlegs	Uncommon		Uncommon	
Lesser Yellowlegs	Abundant	Occasional	Abundant	
Pectoral Sandpiper	Occasional	Occasional	Occasional	
White-Rumped Sandpiper	Occasional		Occasional	
Baird's Sandpiper	Occasional	Occasional	Occasional	
Least Sandpiper	Common	Occasional	Common	
Dunlin	Occasional	Occasional	Occasional	
Long-Billed Dowitcher	Occasional		Occasional	
Stilt Sandpiper	Occasional	Occasional	Occasional	
Semipalmated Sandpiper	Common	Common	Common	
Sanderling	Occasional	Occasional	Occasional	
Wilson's Phalarope	Occasional	Occasional	Occasional	
Northern Phalarope	Occasional		Occasional	
Herring Gull	Common	Occasional	Common	Uncommon
Ring-Billed Gull	Common	Occasional	Common	Uncommon
Franklin's Gull	Occasional		Occasional	
Bonaparte's Gull	Uncommon		Uncommon	
Forster's Tern	Common	Occasional	Common	
Common Tern	Common	Occasional	Common	
Least Tern	Occasional	Occasional	Occasional	
Caspian Tern	Occasional		Occasional	
Black Tern*	Common	Common	Occasional	
Mourning Dove*	Common	Common	Common	Occasional
Yellow-Billed Cuckoo*	Common	Common		
Black-Billed Cuckoo*	Common	Common		
Screech Owl*	Common	Common	Common	Common
Great Horned Owl*	Common	Common	Common	Common

CHECK LIST OF BIRDS (continued)

Common Name	Seasonal Abundance			
	Spring	Summer	Fall	Winter
Snowy Owl				Occasional
Barred Owl*	Common	Common	Common	Common
Long-Eared Owl	Uncommon	Uncommon	Uncommon	Uncommon
Short-Eared Owl	Uncommon	Uncommon	Uncommon	Uncommon
Saw-Whet Owl*	Uncommon	Uncommon	Uncommon	Uncommon
Whippoorwill*	Common	Common		
Common Nighthawk*	Abundant	Abundant	Occasional	
Chimney Swift*	Abundant	Abundant		
Ruby-Throated Hummingbird*	Common	Common		
Belted Kingfisher	Common	Common	Occasional	Uncommon
Yellow-Shafted Flicker*	Common	Common	Common	Uncommon
Pileated Woodpecker*	Occasional	Occasional	Occasional	Occasional
Red-Bellied Woodpecker*	Common	Common	Common	Common
Redheaded Woodpecker*	Common	Common	Common	Rare
Yellow-Bellied Sapsucker	Common		Common	
Hairy Woodpecker*	Common	Common	Common	Common
Downy Woodpecker*	Common	Common	Common	Common
Eastern Kingbird*	Abundant			
Western Kingbird	Uncommon	Uncommon		
Great Crested Flycatcher*	Common	Common		
Eastern Phoebe*	Common	Common	Occasional	
Yellow-Bellied Flycatcher	Uncommon	Uncommon	Uncommon	
Acadian Flycatcher	Occasional	Occasional		
Traill's Flycatcher*	Common	Common	Occasional	
Least Flycatcher*	Abundant	Abundant	Uncommon	
Eastern Wood Pewee*	Common	Common	Uncommon	
Olive-Sided Flycatcher	Occasional	Occasional		
Horned Lark*	Common	Common	Common	Occasional
Tree Swallow*	Abundant	Abundant	Uncommon	
Bank Swallow*	Common	Common	Uncommon	
Rough-Winged Swallow	Occasional	Occasional		
Barn Swallow*	Abundant	Abundant	Uncommon	
Cliff Swallow*	Occasional	Occasional	Uncommon	

CHECK LIST OF BIRDS (continued)

Common Name	Seasonal Abundance			
	Spring	Summer	Fall	Winter
Purple Martin*	Abundant	Abundant	Uncommon	
Blue Jay*	Common	Common	Common	Common
Common Crow*	Abundant	Abundant	Abundant	Occasional
Black-Capped Chickadee*	Common	Common	Common	Common
Tufted Titmouse*	Common	Common	Common	Common
White-Breasted Nuthatch*	Common	Common	Common	Common
Red-Breasted Nuthatch				Rare
Brown Creeper	Common		Common	Common
House Wren*	Abundant	Abundant	Occasional	
Winter Wren	Occasional		Occasional	
Bewick's Wren	Occasional		Occasional	
Carolina Wren	Occasional	Occasional	Occasional	
Long-Billed Marsh Wren*	Common	Common		
Short-Billed Marsh Wren*	Occasional	Occasional		
Catbird*	Common	Common	Occasional	
Brown Thrasher*	Common	Common	Occasional	
Robin*	Common	Common	Common	Rare
Wood Thrush*	Common	Common	Common	
Hermit Thrush	Common		Common	
Swainson's Thrush	Common		Common	
Gray-Cheeked Thrush	Common		Common	
Veery	Common		Common	
Eastern Bluebird*	Common	Common	Commonq	Rare
Blue-Gray Gnatcatcher	Uncommon	Uncommon		
Golden-Crowned Kinglet	Occasional		Occasional	Occasional
Ruby-Crowned Kinglet	Common		Common	
Bohemian Waxwing				Occasional
Cedar Waxwing*	Common	Common	Common	Occasional
Northern Shrike			Occasional	Occasional
Loggerhead Shrike	Common	Common	Common	
Starling*	Abundant	Abundant	Abundant	Abundant
White-Eyed Vireo*	Common	Common		
Bell's Vireo*	Uncommon	Uncommon		
Yellow-Throated Vireo*	Common	Common	Common	
Solitary Vireo	Occasional		Occasional	

CHECK LIST OF BIRDS (continued)

Common Name	Seasonal Abundance			
	Spring	Summer	Fall	Winter
Red-Eyed Vireo*	Common	Common	Occasional	
Warbling Vireo*	Abundant	Abundant	Abundant	
Black-and-White Warbler	Common		Common	
Prothonotary Warbler*	Common	Common		
Blue-Winged Warbler*	Occasional	Occasional		
Golden-Winged Warbler	Occasional	Occasional		
Tennessee Warbler	Common		Common	
Orange-Crowned Warbler	Occasional		Occasional	
Nashville Warbler	Occasional		Occasional	
Parula Warbler	Rare		Rare	
Yellow Warbler*	Abundant	Abundant	Occasional	
Magnolia Warbler	Common		Common	
Cape May Warbler	Occasional		Occasional	
Black-Throated Blue Warbler	Occasional		Occasional	
Myrtle Warbler	Abundant		Abundant	
Black-Throated Green Warbler	Common		Common	
Cerulean Warbler	Rare			
Blackburnian Warbler	Common		Common	
Chestnut-Sided Warbler	Occasional		Occasional	
Bay-Breasted Warbler	Occasional		Occasional	
Blackpoll Warbler	Common		Common	
Pine Warbler	Occasional		Occasional	
Palm Warbler	Common		Common	
Ovenbird	Occasional	Occasional	Occasional	
Northern Waterthrush	Common		Common	
Louisiana Waterthrush	Occasional	Occasional	Occasional	
Kentucky Warbler	Rare	Rare		
Connecticut Warbler	Rare		Rare	
Mourning Warbler	Occasional		Occasional	
Yellowthroat*	Abundant	Abundant	Occasional	
Yellow-Breasted Chat	Rare	Rare		
Hooded Warbler	Rare	Rare		
Wilson's Warbler	Common		Common	
Canada Warbler	Common		Common	
American Redstart*	Abundant	Abundant	Abundant	
House Sparrow*	Abundant	Abundant	Abundant	Abundant
Bobolink*	Occasional	Occasional	Occasional	

CHECKLIST OF BIRDS (continued)

Common Name	Seasonal Abundance			
	Spring	Summer	Fall	Winter
Eastern Meadowlark*	Common	Common	Common	Occasional
Western Meadowlark*	Occasional	Occasional	Occasional	Occasional
Yellow-Headed Blackbird*	Occasional	Occasional	Occasional	
Red-Winged Blackbird*	Abundant	Abundant	Abundant	Abundant
Orchard Oriole*	Uncommon	Uncommon		
Baltimore Oriole*	Common	Common		
Rusty Blackbird	Common		Common	Occasional
Brewer's Blackbird	Uncommon	Occasional	Uncommon	Rare
Common Grackle*	Abundant	Abundant	Abundant	Uncommon
Scarlet Tanager*	Occasional	Occasional	Occasional	
Cardinal*	Common	Common	Common	Common
Rose-Breasted Grosbeak*	Common	Common		
Indigo Bunting*	Common	Common	Occasional	
Dickcissel*	Common	Common		
Evening Grosbeak				Occasional
Purple finch	Occasional		Occasional	Occasional
Common Redpoll				Uncommon
Pine Siskin	Occasional		Occasional	Occasional
American Goldfinch*	Abundant	Abundant	Abundant	Common
Red Crossbill				Rare
Rufous-Sided Towhee*	Abundant	Abundant	Abundant	Common
Savannah Sparrow	Occasional	Occasional	Occasional	
Grasshopper Sparrow	Occasional	Occasional	Occasional	
Henslow's Sparrow	Rare	Rare	Uncommon	
Le Conte's Sparrow	Uncommon	Uncommon	Uncommon	
Vesper Sparrow*	Occasional	Occasional		
Lark Sparrow	Occasional	Occasional		
Slate-Colored Junco	Common		Common	Common
Tree Sparrow	Common		Abundant	Abundant
Chipping Sparrow*	Abundant	Abundant	Abundant	
Clay-Colored Sparrow	Uncommon	Uncommon	Uncommon	
Field Sparrow*	Common	Common	Common	Rare
Harris' Sparrow	Common		Common	
White-Crowned Sparrow	Occasional		Occasional	Rare
White-Throated Sparrow	Abundant		Abundant	Rare
Fox Sparrow	Occasional		Occasional	

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 88

CHECK LIST OF BIRDS (continued)

Common Name	Seasonal Abundance			
	Spring	Summer	Fall	Winter
Lincoln's Sparrow	Common		Common	
Swamp Sparrow*	Common	Common	Occasional	
Song Sparrow	Abundant	Abundant	Common	Rare
Lapland Longspur	Occasional		Occasional	Occasional
Snow Bunting				Uncommon

* Nests on Refuge

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 88

CHECKLIST OF AMPHIBIANS AND REPTILES FOUND IN THE
UPPER MISSISSIPPI RIVER WILDLIFE AND FISH REFUGE

Common Name	Scientific Name	Abundance
Snapping Turtle	Chelydra serpentina	Common
Wood Turtle	Clemmys insculpta	Rare
Ornate Box Turtle	Terrapene ornata	Occasional
Map Turtle	Graptemys geographica	Common
False Map Turtle	Graptemys pseudogeographica	Common
Painted Turtle	Chrysemys picta	Common
Blanding's Turtle	Emydoidea blandingi	Common
Smooth Softshell	Trionyx muticus	Common
Spiny Softshell	Trionys spinifer	Common
Six-Lined Racerunner	Cnemidophorus sexlineatus	Common
Northern Water Snake	Natrix sipedon sipedon	Common
Brown (DeKay's) Snake	Storeria dekayi	Uncommon
Red-bellied Snake	Storeria occipitomaculata	Uncommon
Eastern Garter Snake	Thamnophis sirtalis	Common
Eastern Hognose Snake	Heterodon platyrhinos	Occasional
Ringneck Snake	Diadophis punctatus	Occasional
Blue Racer	Coluber constrictor foxi	Common
Fox Snake	Elaphe vulpina	Occasional
Black Rat Snake	Elaphe obsoleta obsoleta	Common
Bullsnake	Pituophis melanoleucus sayi	Common
Eastern Milk Snake	Lampropeltis doliata triangulum	Occasional
Massasauga	Sistrurus catenatus	Rare
Timber Rattlesnake	Crotalus horridus horridus	Rare
Mud Puppy	Necturus maculosus	Common
Eastern Tiger Salamander	Ambystoma tigrinum tigrinum	Common
American Toad	Bufo americanus	Common
Blanchard's Cricket Frog	Acris crepitans blanchardi	Common
Spring Peeper	Hyla crucifer	Common
Gray Tree Frog	Hyla versicolor	Common
Western Chorus Frog	Pseudacris triseriata triseriata	Common

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EXHIBIT 89 CHECKLIST OF AMPHIBIANS AND REPTILES FOUND IN THE
UPPER MISSISSIPPI RIVER
WILDLIFE AND FISH REFUGE

AMPHIBIANS AND REPTILES FOUND IN UPPER MISSISSIPPI RIVER REFUGE (continued)

Common Name	Scientific Name	Abundance
Bullfrog	Rana catesbeiana	Common
Green Frog	Rana clamitans melanota	Common
Leopard Frog	Rana pipiens	Common
Pickerel Frog	<u>Rana palustris</u>	Rare
Wood Frog	Rana sylvatica	Occasional

CHECKLIST OF FISHES FOUND IN THE UPPER MISSISSIPPI RIVER BASIN

Petromyzontidae - lampreys

Chestnut lamprey Ichthyomyzon castaneus Girard
Silver lamprey Ichthyomyzon unicuspis Hubbs and Trautman

Acipenseridae - sturgeons

Lake sturgeon Acipenser fulvescens Rafinesque
Pallid sturgeon Scaphirhynchus albus (Forbes and Richardson)
Shovelnose sturgeon Scaphirhynchus platorynchus (Rafinesque)

Polyodontidae - paddlefishes

Paddlefish Polyodon spathula (Walbaum)

Lepisosteidae - gars

Spotted gar Lepisosteus oculatus (Winchell)
Longnose gar Lepisosteus osseus (linnaeus)
Shortnose gar Lepisosteus platostomus Rafinesque

Amiidae - bowfins

Bowfin Amia calva Linnaeus

Clupeidae - herrings

Skipjack herring Alosa chrysochloris (rafinesque)
Ohio shad Alosa ohiensis Evermann
Gizzard shad Dorosoma cepedianum (LeSueur)
Threadfin shad Dorosoma petenense (Gunther)

Salmonidae - trouts, whitefishes, and graylings

Cisco or lake herring Coregonus artedii LeSueur
Rainbow trout Salmo gaidneri Richardson

Hiodontidae - mooneyes

Goldeye Hiodon alosaides (Rafinesque)
Mooneye Hiodon terqisus (LeSueur)

*From Appendix L, "Fish and Wildlife", Upper Mississippi River Comprehensive Study, 1970.

Umbridae - mudminnows

Central mudminnow Umbra limi (Kirtland)

Esocidae - pikes

Grass pickerel Esox americanus vermiculatus LeSueur
Northern pike Esox lucius Linnaeus
Muskellunge Esox masquinongy Mitchill

Cyprinidae - minnows and carps

Stoneroller Campostoma anomalum (Rafinesque)
Southern redbelly dace Chrosomus erythrogaster (Rafinesque)
Carp Cyprinus carpio Linnaeus
Ozark minnow Dionda nubila (Forbes)
Silverjaw minnow Ericymba buccata Cope
Brassy minnow Hybognathus hankinsoni Hubbs
Cypress minnow Hybognathus hayi Jordan
Silvery minnow Hybognathus nuchalis Agassiz
Northern plains minnow Hybognathus placitas Girard
Speckled chub Hybopsis aestivalis (Girard)
Flathead chub Hybopsis gracilis (Richardson)
Sheepshead
Sicklefin chub Hybopsis meeki Jordan and Evermann
Silver chub Hybopsis storeriana (Kirtland)
Gravel chub Hybopsis x-punctata Hubbs and Crowe
Golden shiner Notemigonus crysoleucas (Mitchill)
Pallid shiner Notropis amnis Hubbs and Greene
Pugnose shiner Notropis anogenus Forbes
Emerald shiner Notropis atherinoides Rafinesque
River shiner Notropis blennius (Girard)
Ghost shiner Notropis buchanani Meek
Striped shiner Notropis chrysocephalus (Rafinesque)
Common shiner Notropis cornutus (Mitchill)
Bigmouth shiner Notropis dorsalis (Agassiz)
Spottail shiner Notropis hudsonius (Clinton)
Red shiner Notropis lutrensis (Baird and Girard)
Rosyface shiner Notropis rubellus (Agassiz)
Silverband shiner Notropis shumardi
Spotfin shiner Notropis spilopterus (Cope)
Sand shiner Notropis stramineus (Cope)
Weed shiner Notropis texanus (Girard)

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EXHIBIT 90

Blacktail shiner Notropis vensutus (Girard)
Mimic shiner Notropis volucellus (Cope)
Pugnose minnow Notropis emiliae
Suckermouth minnow Phenacobius mirabilis (Girard)
Bluntnose minnow Pimephales notatus (Rafinesque)
Fathead minnow Pimephales promelas Rafinesque
Bullhead minnow Pimpephales vigilax (Baird and Girard)
Longnose dace Rhinichthys cataractae (Valenciennes)
Creek chub Semotilus atromaculatus (Mitchill)

Catostromidae - suckers

River carpsucker Carpiodes carpio (Rafinesque)
Quillback Carpiodes cyprinus (LeSueur)
Highfin carpsucker Carpiodes velifer (Rafinesque)
White sucker Catostomus commersoni (Lacepede)
Blue sucker Cycleptus elongatus (LeSueur)
Northern hog sucker Hypentelium nigricans (LeSueur)
Smallmouth buffalo Ictiobus bubalus (Rafinesque)
Bigmouth buffalo Ictiobus cyprinellus (Valenciennes)
Black buffalo Ictiobus niger (Rafinesque)
Spotted sucker Minytrema melanops (Rafinesque)
Silver redhorse Moxostoma anisurum (Rafinesque)
Golden redhorse Moxostoma erythrurum (Rafinesque)
Northern redhorse Moxostoma macrolepidotum (LeSueur)
Greater redhorse Moxostoma valenciennesi Jordan

Ictaluridae - freshwater catfishes

Blue catfish Ictalurus furcatus (LeSueur)
Black bullhead Ictaluras melas (Rafinesque)
Yellow bullhead Ictalurus nebulosus (LeSueur)
Brown bullhead Ictalurus nebulosus (LeSueur)
Channel catfish Ictalurus punctatus (Rafinesque)
Stonecat Noturus flavus Rafinesque
Tadpole madtom Noturus gyrinus (Mitchill)
Flathead catfish Pylodictis olivaris (Rafinesque)

Anguilliade - freshwater eels

American eel *Anguilla rostrata* (LeSueur)

Cyprinodontidae - killifishes

Blackstripe topminnow *Fundulus notatus* (Rafinesque)

Poeciliidae - livebearers

Mosquitofish *Gambusia affinis* (Baird and Girard)

Gadidae - codfishes and hakes

Burbot *Lota lota* (linnaeus)

Gasterosteidae - sticklebacks

Brook stickleback Eucalia inconstans (Kirtland)

Percopsidae - trout perches

Trout-perch *Percopsis omiscomaycus* (Walbaum)

Aphredoderidae - pirate perches

Pirate perch *Aphredoderus sayanus* (Gilliams)

Serranidae - sea basses

White bass *Roccus chrysops* (Rafinesque)
Yellow bass *Roccus mississippiensis* (Jordan and Eigenmann)

Centrarchidae - sunfishes

Rock bass *Ambloplites rupestris* (Rafinesque)
Warmouth *Chaenobryttus gulosus* (Cuvier)
Green sunfish *Lepomis cyanellus* Rafinesque
Pumpkinseed *Lepomis gibbosus* Rafinesque
Orangespotted sunfish *Lepomis humilis* (Girard
Bluegill *Lepomis macrochirus* Rafinesque
Longear sunfish *Lepomis megalotis* (Rafinesque)

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Redear sunfish Lepomis microlophus (Gunther)
Smallmouth bass Micropterus dolomieui Lacepede
Largemouth bass Micropterus salmoides (Lacepede)
White crappie Pomoxis annularis Rafinesque
Black crappie Pomoxis nigromaculatus (LeSueur)

Percidae - perches

Crystal darter Ammocrypta asprella (Jordan)
Western sand darter Ammocrypta clara Jordan and Meek
Mud darter Etheostoma asprigene (Forbes)
Rainbow darter Etheostoma caeruleum Storer
Bluntnose darter Etheostoma chlorosomum (Hay)
Iowa darter Etheostoma exile (Girard)
Fantail darter Etheostoma flabellare Rafinesque
Johnny darter Etheostoma nigrum Rafinesque
Branded darter Etheostoma zonale (Cope)
Yellow perch Perca flavescens (Mitchill)
Longperch Percina caprodes (Rafinesque)
Blackside darter Percina maculata (Girard)
Slenderhead darter Percina phoxocephala (Nelson)
River darter Percina shumardi (Girard)
Sauger Stizostedion canadense (Smith)
Walleye Stizostedion vitreum vitreum (Mitchill)

Sciaenidae - drums

Freshwater drum Aplodinotus grunniens Rafinesque

Atherinidae - silversides

Brook silverside Labidesthes sicculus (Cope)

TOTAL MACRO-INVERTEBRATES COLLECTED AT TWO
MISSISSIPPI RIVER SAMPLING STATIONS

Organisms	Station 764.5	Station 760.5
Trichoptera		
Agraylea	14	20
Cheumatopsyche	28	1
Hydropsyche	19	1
Ephemeroptera		
Heptagenia	5	-
Isonychia	2	-
Tricorythodes	9	-
Plecoptera		
Perlesta	2	-
Coleoptera		
Agabus	1	-
Diptera		
Simulium	1	1
Calopsectra	1	-
Cricotopus	25	4
Hydrobaenus	3	-
Tendipes	50	26
Polypedilum	-	1
Odonta		
Coenagrion	-	1
Isopoda		
Asellus	4	-
Amphipeda		
Gammarus	18	13
Turbellaria		
Planaria	-	3

TOTAL MACRO-INVERTEBRATES COLLECTED AT TWO
MISSISSIPPI RIVER SAMPLING STATIONS

EXHIBIT 91

MACRO-INVERTEBRATES COLLECTED AT MISSISSIPPI RIVER (continued)

Organisms	Station 764.5	Station 760.5
Annelida	16	9
Hydrozoa	15	25
Gastropoda		
Physa	1	24

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ST. PAUL DISTRICT

EXHIBIT 91

OCCURRENCE OF ZOOPLANKTON COLLECTED ABOVE AND BELOW THE HEATED OUTFALL OF THE DAIRYLAND POWER COMPLEX

Organisms	Number of Organisms Per Liter: Upstream Transect A	Downstream Transects B	Downstream Transects C	Downstream Transects D
Eucyclops agilis	16.3	14.6	16.0	15.2
Cyclops vernalis	[illegible]	.3	.1	.7
Diaptomus ashlandi	[illegible]	.7	.3	.4
Diaptomus sp.	.3	.4	.1	.2
Daphnia pulex	1.3	1.7	.8	.7
Daphnia longispina	[illegible]	.9	3.9	1.9
Bosmina longirostris	.3	.6	.5	.4
Biomass* (mg. dry wt./l.)	4.686	5.069	4.025	5.392

*Phytoplankton and zooplankton combined.

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OCCURRENCE OF ZOOPLANKTON

EXHIBIT 92

OCCURRENCE OF PHYTOPLANKTON COLLECTED ABOVE AND BELOW THE HEATED OUTFALL OF THE DAIRYLAND POWER COOPERATIVE COMPLEX AT GENOA, WISCONSIN

Organism	Organisms/liter Locations			
	Tran. A	Tran. B	Tran. C	Tran. D
Ulothrix aequalis, Kuetz	18,581	35,325	15,651	25,488
Ulothrix variabilis, Kuetz	4,940	7,957	3,803	7,213
Scenedesmus quadricauda, (Turp.) de Brebisson	480	524	349	568
Scenedesmus dimorphus, (Turp.) Kuetz	568	349	262	306
Pediastrum boryanum, (Turp.) Meneghini	262	874	306	437
Pediastrum duplex, Meyen		174		131
Golenkinia radiata, (Chod.) Wille	43			
Selenastrum westii, Smith		306		
Tetraedon trigonum, (Naez.) Hansgirg		131		
Pandorina morum (Muell.) Bory		43		
Gloeocystis gigas (Kuetz.) Lagerheim				174
Actinastrum hantzchu, Lagerheim	87	393	43	262
Staurastrum paradoxum, Meyen			87	87
Coelastrum microporum, Naegeli			43	43
Chlomydomonas sp.	87			87
Ankistrodesmus falcatus (Chod.) Lemm				43
Anabaena circinalis, Rabenhorst	218	131	87	87
Oscillatoria sancta. (Kuetz.) Gomont)	918	612	349	306
Gomphosphaeria lacustris, Lemm	43	43	43	87
Nodularia spumigena, Mertens	393	87		43
Merismopedia elegans, Braun	43			
Dactylococcus fasciculoris, Lemm	43			131
Chroococcus minor, (Kuetz.) Naegeli				218
Phormidium retzii, (Ag.) Gomont	174	43	131	
Microcystis aeruginosa, Kuetz, emend, Elenkin		87		
Euglena sp.	43		43	
Dinobryon sertularia, Ehrenberg				43
Navicula sp.	306		218	393
Synedra delicatissima, W. Sm.	918	393	306	480
Stephanodiscus astraea, Grun.	5,246	568	1,748	3,104
Fragillaria crotonensis, Kitton	480	830	524	1,049
Melosira distans, Kutz.	1,136	7,476	131	480
Asterinella formosa, Hass.	4,109	5,333	2,229	3,934
Asterinella ralfsii, W. Sm.	743	524	87	262
Gyrosigma acuminatum, Rabenhorst		87		

EXHIBIT 93

OCCURRENCE OF PHYTOPLANKTON

SPECIES AND OCCURRENCE OF BENTHOS COLLECTED ON
FOUR TRANSECTS ON THE MISSISSIPPI RIVER
AT GENOA, WISCONSIN IN JUNE 1972

Species	Organisms per Square Meter			
	Upstream Transect	Downstream Transects		
	A	B	C	D
Amphipoda				
Hvallella azteca	60	23		63
Insecta				
Tendipendidae				
Tendipes plumosus	132	40	21	92
Tendipes tentans	441	159	928	219
Tendipes sp.	34	14		
Heleidae	267*		536	333
Palpomyia sp.	266	342		
Unidentified	76			
Cuclicidae				
Chaeoborus sp.	11		12	
Plexoptera	14			
Trichoptera				
Hydropsychidae				
Clematopsyche sp.	34			
Oligochaeta	110	49	201	211
TOTAL/m^2	1,445	627	1,698	918
Biomass mg/m^2 expressed as wet weight	457.4	172.2	660.8	194.7

*First instar Larvae

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SPECIES AND OCCURRENCE OF BENTHOS: MISSISSIPPI RIVER
AT GENOA, WISCONSIN IN JUNE 1972 EXHIBIT 94

FRESHWATER MUSSELS SAMPLED BY MAX M. ELLIS IN 1930-31
FROM SECTION OF THE UPPER MISSISSIPPI RIVER
WHICH INCLUDED THE PRESENT POOL 9 REGION

Species	Number	Species	Number
Fusconaia ebenus	2	Fusconaia undata	21
Megalonaias gigantea	5	Amblema peruviana	24
Quadrula pustulosa	11	Quadrula nodulata	1
Quadrula metanevra	1	Tritigonia verrucosa	16
Elliptic dilatatus	24	Arcidens confragosus	2
Lasmigona complanata	8	Anodonta corpulenta	22
Anodonta imbecillis	10	Strophitus rugosus	38
Obliquaria reflexa	23	Obovaria olivaria	6
Actinonaias carinata	32	Truncilla truncata	8
Truncilla donaciformis	4	Plagiola lineolata	6
Leptodea fragilis	20	Proptera alata	49
Ligumia recta latissima	2	Lampsilis anodontoides	14
Lampsilis anodontoides fallaciosa	4	Lampsilis siliquoidea	30
Lampsilis ventricosa	29	Lampsilis higginsii	2

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EXHIBIT 95a FRESHWATER MUSSELS SAMPLED BY MAX M. ELLIS IN 1930-31
FROM SECTION OF THE UPPER MISSISSIPPI RIVER
WHICH INCLUDED THE PRESENT POOL 9 REGION

FRESHWATER MUSSELS SAMPLED DURING THE SUMMER OF 1973
UNDER THE ENVIRONMENTAL IMPACT ASSESSMENT CONTRACT
WITH NORTH STAR RESEARCH INSTITUTE*

Species	Common Name	Pool Number
Fusconaia ebena	Niggerhead	10
Megalonaias gigantia	Washboard	10
Amblema plicata	Three-ridge	10
Quadrula quadrula	Maple leaf	10
Tritrogonia verruscosa	Buckhorn	10
Arcidens confragosus	Rock pocket book	10
Actinonais ligamentina	Mucket	10, 1
Plagiola lineolata	Butterfly	10
Ligumia recta	Black sand-shell	10
Lampsilis anodontoides	Sand-shell	10
Lampsilis ventricosa	Pocket book	10,3
Quadrula nodulata	Warty-back	10
Pisidium sp	Pill clams	5, 4, St. Croix, 3
Sphaerium sp	Fingernail	5, 6, 4, 1
Musculium sp		5, 6, 4, 3
Lampsilis anodontoides fallaciosa	Yellow sand-shell	10
Quadrula pustulosa	Pimpleback	3

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EXHIBIT 95b

FRESHWATER MUSSELS SAMPLED DURING THE SUMMER
OF 1973 UNDER THE ENVIRONMENTAL IMPACT ASSESSMENT
CONTRACT WITH NORTH STAR RESEARCH INSTITUTE

FRESHWATER MUSSELS SAMPLED DURING THE SUMMER OF 1973
UNDER THE ENVIRONMENTAL IMPACT ASSESSMENT CONTRACT
WITH NORTH STAR RESEARCH INSTITUTE* (Cont'd)

Species	Common Name	Pool Number
Pluerobema coccineum mississippiensis	Pink pig toe	3
Lampsilis siliquoides	Fat mucket	3
Proptera alata	Winged lampshell	3
Fusconia undata	Pig toe	3
Anodonta gigantea	Floater	3

*No attempt was made to depict relative abundance as such data could not be compared with "Number" in Exhibit 95a. The identification of species was not carried beyond the taxonomic level of family for pools 7, 8, and 9; therefore, this data was not included. Freshwater mussels were not found in the Lower Minnesota River and pool 2. Refer to the various assessment reports for more detailed information.

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EXHIBIT 95b

ENDANGERED ANIMALS OF THE UPPER MISSISSIPPI RIVER BASIN
(From "Official List of Endangered Native Fish and Wildlife" as amended and published in the Federal Register Vol. 38, No. 106, June 4, 1973)

Animal	Present Distribution
Indiana Bat Myotis sodalis Status endangered with estimated population 500,000	Midwest and eastern United States from the western edge of Ozark Region in Oklahoma to central Vermont, to southern Wisconsin, and as far south as northern Florida.
Timber Wolf Canis lupus lycaon Status endangered with estimated population 300-500	Lake Superior Region of Michigan, Wisconsin, and Minnesota.
Southern Bald Eagle Haliaectus leucocephalus Status endangered with about 230 active nests in 1963.	Nests primarily in Atlantic and Gulf coasts but ranges northward in summer to northern United States and Canada.
American Peregrine Falcon Falco peregrinus anatum Status rare with estimated population 5,000-10,000	Breeds from northern Alaska to southern Greenland south to Baja, California; winters in northern United States.

ENDANGERED ANIMALS OF THE UPPER MISSISSIPPI RIVER BASIN

EXHIBIT 96

THREATENED ANIMALS OF THE UPPER MISSISSIPPI RIVER BASIN
*(From BSFW Res. Pub. No. 114, 1973)

Animal	Present Distribution
N. Greater Prairie Chicken Tympanuchus cupido pinnatus Status rare within Basin.	Resident locally in prairie habitat from central southern Canada south to northeastern Colorado, northwestern Kansas and northeastern Oklahoma east to northern Michigan, Indiana, Wisconsin, Illinois and Missouri.
Lake Sturgeon Acipenser fulvescens Status rare with estimated size of population unknown.	Distributed throughout Great Lakes Drainage with records from Mississippi and St. Croix Rivers.

*Bureau of Sport Fisheries and Wildlife Resource Publication No. 114, 1973

EXHIBIT 97 THREATENED ANIMALS OF THE UPPER MISSISSIPPI RIVER BASIN

LOCALLY RARE ANIMALS OF THE PROJECT AREA *

Common Name	Scientific Name
Moose	*Alces alces*
Canada Lynx	*Lynx canadensis*
Bobcat	Lynx rufus
Star-nose Mole	*Condylura cristata*
Double-crested Cormorant	*Phalacrocurax auritus*
Northern Bald Eagle	*Haliaeetus leucocephalus*
Osprey	*Pandion haliaetus*
Trumpeter Swan	*Olor buccinator*
Coopers Hawk	*Accipiter cooperii*
Red-shouldered Hawk	*Buteo lineatus*
Marsh Hawk	*Circus cyaneus*
Great Sandhill Crane	*Grus canadensis*
False Map Turtle	*Graptemys pseudogeographica*
Blandings Turtle	*Emys blandingii*
Six-lined Racerunner	*Cnemidophorus sexilineatus*
Blue-tailed Skink	*Eumeces faciatus*
Massasauga	*Sistrurus catenatus*
Paddlefish	*Polydon spathula*
Blue sucker	*Cycleptus elongatus*
River Redhorse	*Moxostoma carinatum*
Greater Redhorse	*Moxostoma valenciennesi*
Pirate Perch	*Aphredodorus sayanus*
Least Darter	*Etheostoma microperca*
Gilt Darter	*Percina evides*
Weed Shiner	*Notropis texanus*
Skipjack Herring	*Alosa chrysochloris*
American Eel	*Anguilla rostrata*

*Derived in part, from lists prepared by Minnesota Department of Natural Resources, 1973 and Wisconsin Department of Natural Resources 1973.

LOCALLY RARE ANIMALS OF THE PROJECT AREA

RARE AND ENDANGERED PLANTS BY HABITAT
MINNESOTA DEPARTMENT OF NATURAL RESOURCES, 1971

	Moist Prairie Habitat
Moist Meadows	Wild orange-red lily, wood lily, Lilium philadelphicum Shooting star, Dodecatheon meadia Small white ladyslipper, Cypripedium candidum (orchid) Prairie phlox, Phlox pilosa Blue-eyed grass, Sisyrinchium augustifolium
	In Hardwoods in the Southeast
Fairly open Hardwoods	Bluebell, Virginia cowslip or Lungwort, Mertensia virginica *Minnesota trout-lily, Erythronium propullans *Adam-and-Eve root, Aplectrum hyemale (orchid)
	Northern Forest
Fairly open Coniferous	Yew, Taxus canadensis Ram's-head ladyslipper, Cypripedium arietinum (orchid)

*Has always been fairly rare.

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RARE AND ENDANGERED PLANTS BY HABITAT

EXHIBIT 99

PLANTS LEGALLY PROTECTED IN MINNESOTA*

Ericaceae; Heath Family
 Epigaea repens, Trailing Arbutus.

Gentianaceae; Gentian Family
 Gentiana, Gentian, all species.

Liliaceae; Lily Family
 Lilium, Lily, all species
 Trillium, trillium, all species.

Nymphaeaceae; Water Lily Family
 Nelumbo lutea, Lotus lily.

Orchidaceae; Orchid Family
 All Species.

*Minnesota State Wildflower Law (Revised 1935)

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PLANTS LEGALLY PROTECTED IN MINNESOTA

EXHIBIT 100

PLANTS RARE IN MINNESOTA AND IN ALL OF NORTH AMERICA
*(T. MORLEY 1972)

Cruciferae; Mustard Family
Draba norvegica, Whitlow-grass: Cook

Leguminosae; Pea Family
Lespedeza leptostachya, Prairie Bush-clover: Cottonwood, Crow Wing, Goodhue

Liliaceae; Lily Family
Erythronium propullans, Dwarf or Minnesota Trout-lily or Adder's Tongue: Goodhue, Rice. Found nowhere else in the world.

Orchidaceae; Orchid Family
Malazis paludosa, Bog Adder's Mouth: Clearwater, Ottertail.

*Unpublished Mimeographed List, Botany Dept, University of Minnesota

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EXHIBIT 101 PLANTS RARE IN MINNESOTA AND IN ALL OF NORTH AMERICA

DESCRIPTION OF ARCHAEOLOGICAL SITES APPARENTLY DESTROYED BY ACTIVITY RELATED TO 9-FOOT CHANNEL PROJECT

1. 21 WA 1 — Schilling Site located SE 1/4 Sec 32 T 27N R 21W
   A mound and village site located on Grey Cloud Island, Washington County, Pool #2. Site has been destroyed by raised water level.

2. 21 DK 1 — Sorg Site located NE 1/4 NE 1/4 Sec 23 T 115N R 18W
   A habitation site located on Spring Lake, Dakota County, Pool #2. The site is under water now.

3. 21 GD 75 — SW 1/4 SE 1/4 Sec 32 T 114N R 15W
   A group of 45 mounds located on Prairie Island, Goodhue County, Pool #3. Thirty-eight mounds are under water, 7 are still above water but are being eroded away by the river.

4. 21 GD 1 — Nauer Site located NW 1/4 Sec 9 T 113N R 15W
   A mound and village group located on the southern tip of Prairie Island, Goodhue County, Pool #3. The mounds were destroyed with the construction of Lock and Dam #3.

5. 21 GD 57 — Nauer Site located NW 1/4 Sec 9 T 113N R 15W
   Part of Site 1, above, Pool #3. Part of the village and several mounds were destroyed with the construction of the recreational area known as "Commissary Point", a picnic ground.

6. Unnumbered — LeSueur and Perrot French Trading Post
   This site is listed as destroyed through "negative evidence". The site is recorded as being on Prairie Island, Goodhue County, Pool #3, and all attempts to locate the site have failed. It is thus assumed that because the post was on the water's edge that it is now under water.

7. Unnumbered — Unnamed Sec 34 T 109N R 9W
   This was a mound and habitation site at the mouth of the Whitewater River, Wabasha County, Pool #5. The landowner pointed the site out to the State Archaeologist after it had been covered with water.

8. Unnumbered — Location T 108N 7W
   The site is a group of mounds on Prairie Island, Winona County. The site was covered by a Corps of Engineers levee. Pool 5 or 5A.

9. Unnumbered — Same location as above.
   This site, although spared in the first levee construction was buried with the addition of a later levee.

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DESCRIPTION OF ARCHAEOLOGICAL SITES APPARENTLY DESTROYED

EXHIBIT 102

POPULATION DATA BY URBAN AREAS AND SELECTED COUNTIES

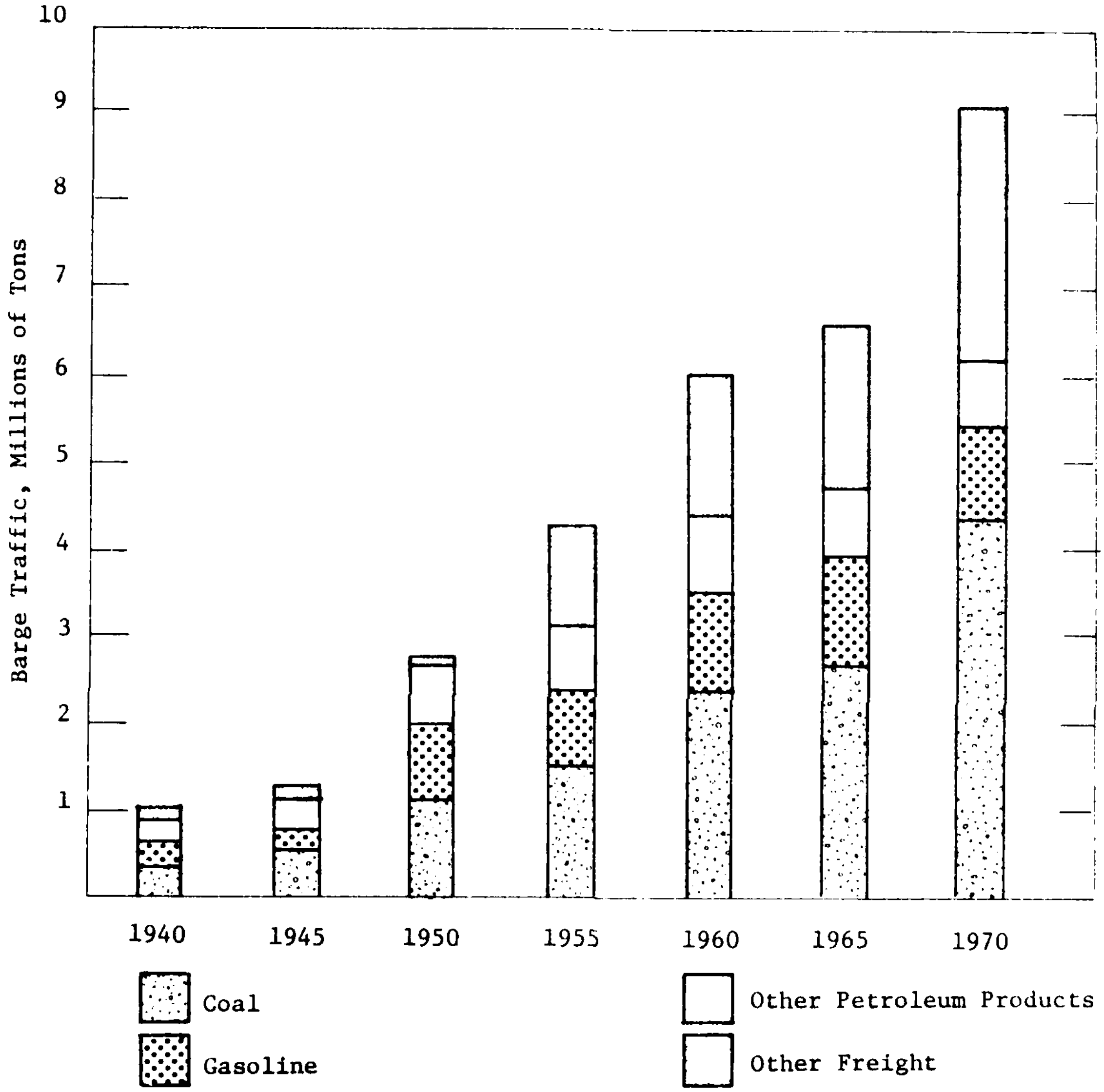
Category	1950	1960	1970	1980	2000	[illegible]
Urban						
Minneapolis	521,718	482,872	434,400	435,000	452,000	[illegible]
St. Paul	311,349	313,411	309,980	312,000	326,500	[illegible]
Winona	25,031	24,895	26,438	28,612	34,906	[illegible]
LaCrosse	47,535	47,573	51,153	55,281	68,600	[illegible]
Stillwater	7,674	8,310	10,191	11,063	[illegible]	[illegible]
Hudson	3,435	4,325	5,049	5,759	7,835	10,810
Hastings	6,560	8,965	12,195	13,644	21,990	[illegible]
Fountain City	934	934	1,017	1,096	1,395	[illegible]
Lansing	1,536	1,325	1,218	1,138	1,070	[illegible]
Prairie Du Chien	5,392	5,649	5,540	5,831	6,618	[illegible]
Guttenberg	1,912	2,087	2,177	2,631	2,838	[illegible]
Minnesota Counties						
Dakota	49,019	78,303	139,808	221,800	433,300	628,000
Goodhue	32,118	33,035	34,763	39,161	36,630	[illegible]
Wabasha	16,878	17,007	17,224	19,517	19,800	17,733
Winona	39,841	40,937	44,409	48,076	61,486	[illegible]
Houston	14,435	16,588	17,556	19,377	26,463	[illegible]
Wisconsin Counties						
Pierce	21,448	22,503	26,652	29,485	33,619	[illegible]
Buffalo	14,719	14,202	13,743	15,065	16,163	[illegible]
Trempealeau	23,730	23,377	23,344	25,516	[illegible]	[illegible]
LaCrosse	67,587	72,465	80,468	87,224	119,509	[illegible]
Veryon	27,906	25,663	24,557	26,762	26,612	[illegible]
Crawford	17,652	16,351	15,252	15,886	14,573	[illegible]
Grant	41,460	44,419	48,398	50,083	63,734	[illegible]
Iowa Counties						
Allamakee	16,351	15,982	14,968	15,724	15,655	15,650
Clayton	22,522	21,962	20,606	21,631	21,518	21,475

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 103 *POPULATION DATA BY URBAN AREAS AND SELECTED COUNTIES*

RECEIPTS OF MAJOR COMMODITIES - ALL PORTS
ST. PAUL DISTRICT

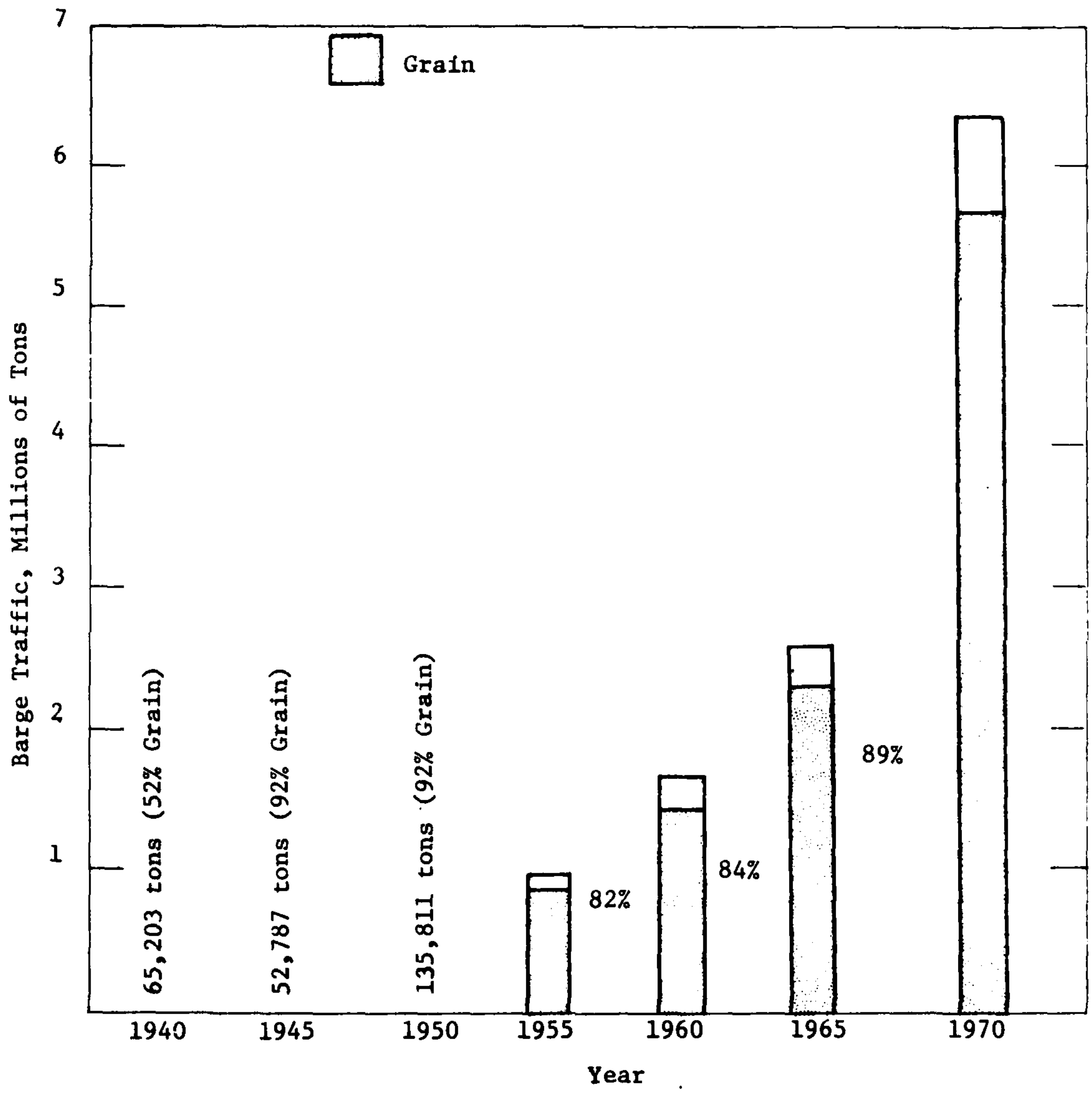


CORPS OF ENGINEERS
ST. PAUL DISTRICT

RECEIPTS OF MAJOR COMMODITIES - ALL PORTS
ST. PAUL DISTRICT

EXHIBIT 104

SHIPMENTS OUT OF THE ST. PAUL DISTRICT



CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 105 SHIPMENTS OUT OF THE ST. PAUL DISTRICT

EXISTING AND PROJECTED COMMERCE[1]
UPPER MISSISSIPPI RIVER BASIN

ock	Mile	Waterborne Commerce million tons						
		1970[2]	1980	1990	2000	2010	2020	2030
Upper St. Anthony	853.7							
Lower St. Anthony	853.4							
Lock 1	847.6	1.6	2.4	2.6	2.7	3.2	3.8	4.2
Lock 2	815.2	7.4	11.9	13.3	14.8	18.0	20.7	23.3
Lock 3	796.9	8.9	14.1	15.5	16.3	19.0	21.6	24.4
Lock 4	752.8	9.2	14.5	15.8	16.7	19.5	22.1	24.9
Lock 5	738.1	9.9	15.6	16.8	17.3	20.0	22.5	25.3
Lock 5A	728.5	9.9	15.6	16.8	17.3	20.0	22.5	25.3
Lock 6	714.3	10.1	16.0	17.3	17.8	20.5	23.0	25.9
Lock 7	702.5	10.1	16.0	17.3	17.8	20.5	23.0	25.9
Lock 8	679.2	10.4	16.4	17.8	18.3	21.1	23.7	26.7
Lock 9	647.9	10.7	16.8	18.1	18.5	21.2	23.8	26.8
ock 10	615.1	10.9	17.2	18.6	19.1	21.9	24.5	27.6

(1) Based on information presented in Phase I Report, Mississippi River, Year-Round Navigation, prepared by U.S. Army Engineer Division, North Central, Corps of Engineers, Chicago, Illinois, September 1973.

(2) Actual values.

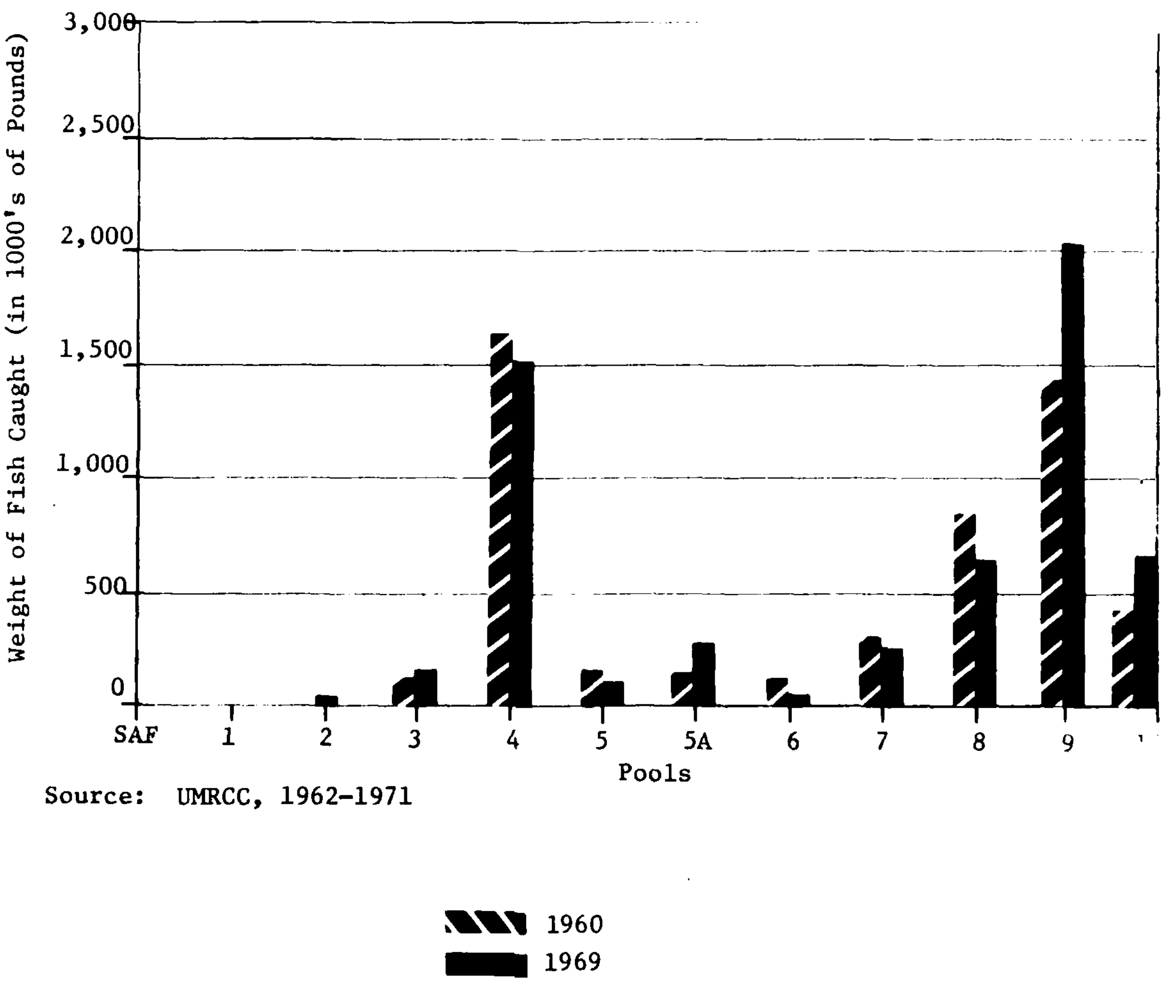
CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXISTING AND PROJECTED COMMERCE
UPPER MISSISSIPPI RIVER BASIN

EXHIBIT 106

FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN IN UPPER MISSISSIPPI RIVER POOLS IN 1960 AND 1969



Source: UMRCC, 1962-1971

EXHIBIT 107a

FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN IN UPPER MISSISSIPPI RIVER POOLS IN 1960 AND 1969

Commercial Fishery Landings*
Upper Mississippi River Basin, 1894-1965

	Fish			Mussels	
Year	Pounds	Cents Per Pound	Value, dollars	Pounds	Value, dollars
1894	21,802,811	2.8	605,900	195,500	2,737
1899	26,683,146	2.7	734,100	47,648,000	216,400
1903	–	–	–	–	–
1908	51,790,700	3.1	1,623,300	39,673,000	306,000
1914–17	–	–	–	49,190,000	590,355
1922	30,267,400	5.2	1,585,235	8,306,000	203,474
1931	14,273,100	4.6	652,621	12,744,077	192,745
1950	28,986,940	8.6	2,481,373	–	–
1954	23,457,390	8.4	1,962,471	–	–
1955	27,596,139	7.7	2,121,410	–	–
1956	25,486,553	7.8	1,987,407	30,000	450
1957	22,190,747	7.8	1,741,907	–	–
1958	25,681,249	7.9	2,040,399	6,000	254
1959	27,393,358	7.2	1,976,650	–	–
1960	26,866,417	6.4	1,725,926	–	–
1961	24,082,677	6.4	1,533,247	–	–
1962	23,887,539	6.3	1,495,453	–	–
1963	25,237,762	6.6	1,669,539	900,000	22,500
1964	27,021,307	6.4	1,735,628	904,100	23,193
1965	24,615,181	6.3	1,555,014	2,122,500	65,083

* Upper Mississippi River Comprehensive Basin Study, Volume VI, Appendix L.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 107b

COMMERCIAL FISHERY LANDINGS
UPPER MISSISSIPPI RIVER BASIN, 1894-1965

Commercial Fishery Landings*
Upper Mississippi River, 1894-1965

Year	Finfish Pounds	Finfish Value, dollars	Mussels Pounds	Mussels Value, dollars
1894	13,432,839	379,379	195,500	2,737
1899	11,143,742	312,105	47,648,000	216,400
1913–14	NA	NA	13,252,000	176,510
1922	13,117,580	713,075	4,453,960	108,844
1931	7,061,260	545,639	5,230,792	82,286
1946	9,000,000	800,000	NA	NA
1947	8,015,064	678,812	NA	NA
1948	9,007,900	701,631	NA	NA
1949	8,890,771	782,544	NA	NA
1950	9,131,130	971,764	–	–
1951	8,674,598	935,019	NA	NA
1952	4,976,766	553,251	NA	NA
1953	5,734,157	742,310	NA	NA
1954	8,160,221	1,034,481	–	–
1955	11,253,752	1,271,102	–	–
1956	9,401,745	1,115,526	–	–
1957	8,618,725	1,034,000	–	–
1958	11,592,571	1,260,479	–	–
1959	12,459,169	1,673,814	–	–
1960	11,607,193	1,156,037	–	–
1961	10,546,325	977,822	–	–
1962	10,457,204	911,822	–	–
1963	11,022,926	1,201,499	–	–
1964	13,486,540	1,249,960	174,100	5,223
1965	11,045,547	958,492	1,326,200	39,176

* Upper Mississippi River Comprehensive Basin Study, Volume VI, Appendix L.

EXHIBIT 107c

COMMERCIAL FISHERY LANDINGS
UPPER MISSISSIPPI RIVER, 1894-1965

Yearly Range of*
Wholesale Prices for Carp,
Chicago Market, 1957 – 1965
(cents/pound)

	Grades		
Year	*Jumbo*	*No. 1*	*Medium*
1957	5-14	4-8	4-8
1958	5-12	4-10	4-8
1959	4-12	4-8	4-6
1960	3-12	3-9	3-8
1961	4-10	4-8	4-7
1962	4-9	4-8	4-6
1963	4-8	4-6	4-5
1964	3-8	2-6	4-5
1965	5-8	3-6	3-4

EXHIBIT 107d

Demand for Commercial Fishery Products*
Produced in the Upper Mississippi Basin

Year	*Basin Population*	*Per Capita Demand (pounds)*	*Internal Demand (pounds)*	*External Demand (pounds)*	*Total Demand (pounds)*
1960	19,316,336	.418	8,074,200	10,000,000	18,074,200
1980	24,722,859	.598	14,820,100	10,000,000	24,820,100
2000	29,689,203	.673	19,995,700	10,000,000	29,995,700
2020	32,972,985	.825	27,202,700	10,000,000	37,202,700

* Upper Mississippi River Comprehensive Basin Study, Volume VI, Appendix L.

EXHIBIT 107e

Commercial Fishery Employment
Upper Mississippi River- 1965*

State	Finfish Harvesting			Mussel-shell Harvesting		
	Full	Part-time	Total	Full	Part-time	Total
Iowa	104	316	420	---	---	---
Wisconsin	89	581	670	45	30	75
Minnesota	8	74	82	---	---	---
TOTALS	201	971	1172	45	30	75

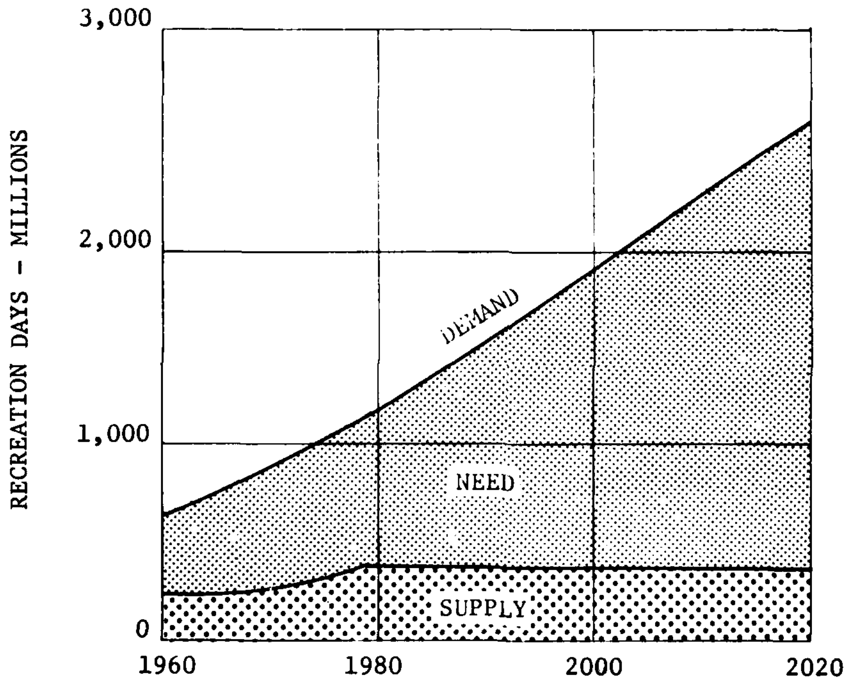
* Taken in part from the Upper mississippi River Comprehensive Basin Study, Volume VI, Appendix L.

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 107f

COMMERCIAL FISHERY EMPLOYMENT
UPPER MISSISSIPPI RIVER- 1965

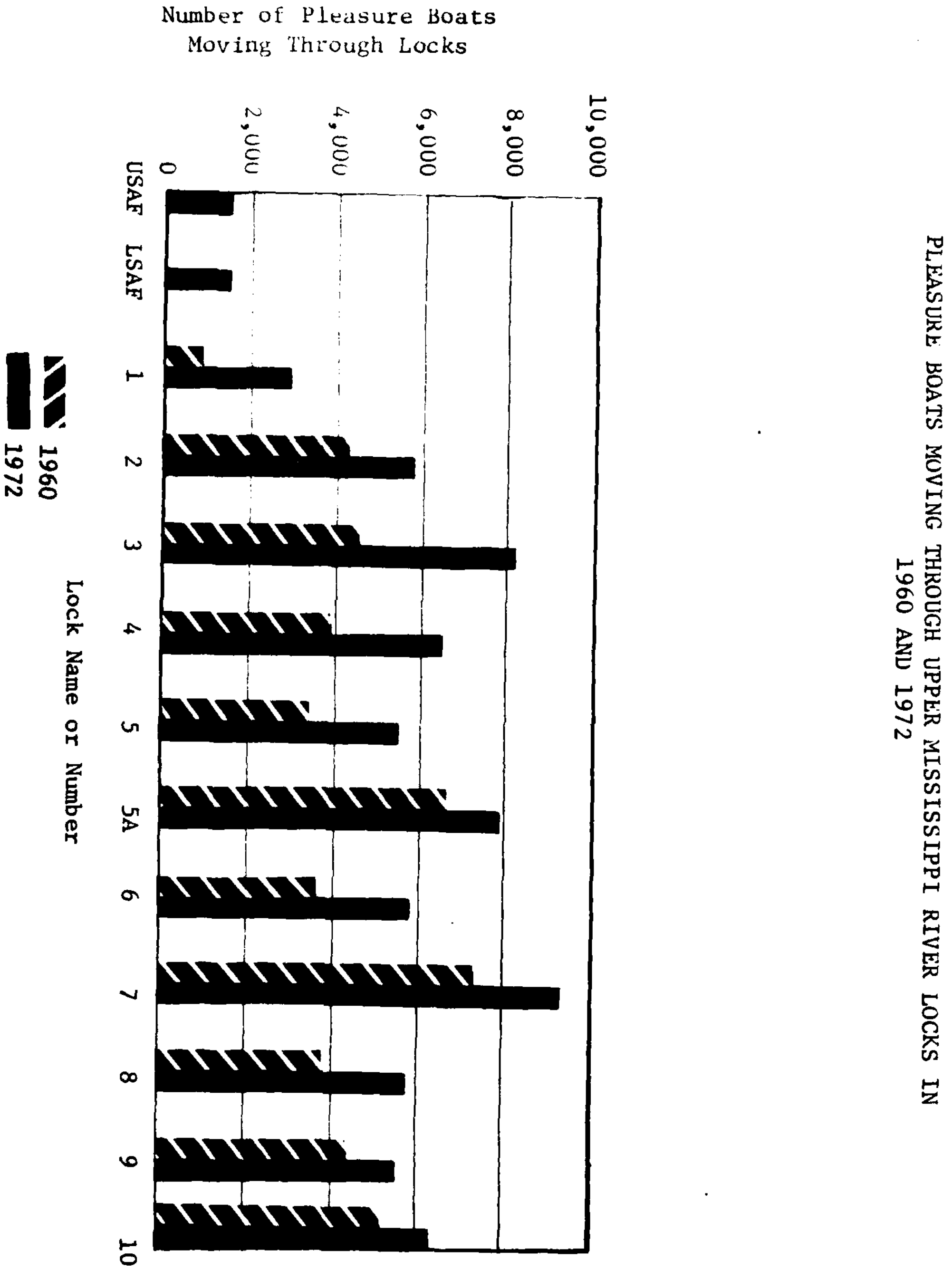
UPPER MISSISSIPPI RIVER BASIN PROJECTED RECREATIONAL
DEMAND, SUPPLY, AND NEED



CORPS OF ENGINEERS
ST. PAUL DISTRICT

UPPER MISSISSIPPI RIVER BASIN PROJECTED RECREATIONAL
DEMAND, SUPPLY, AND NEED

EXHIBIT 108



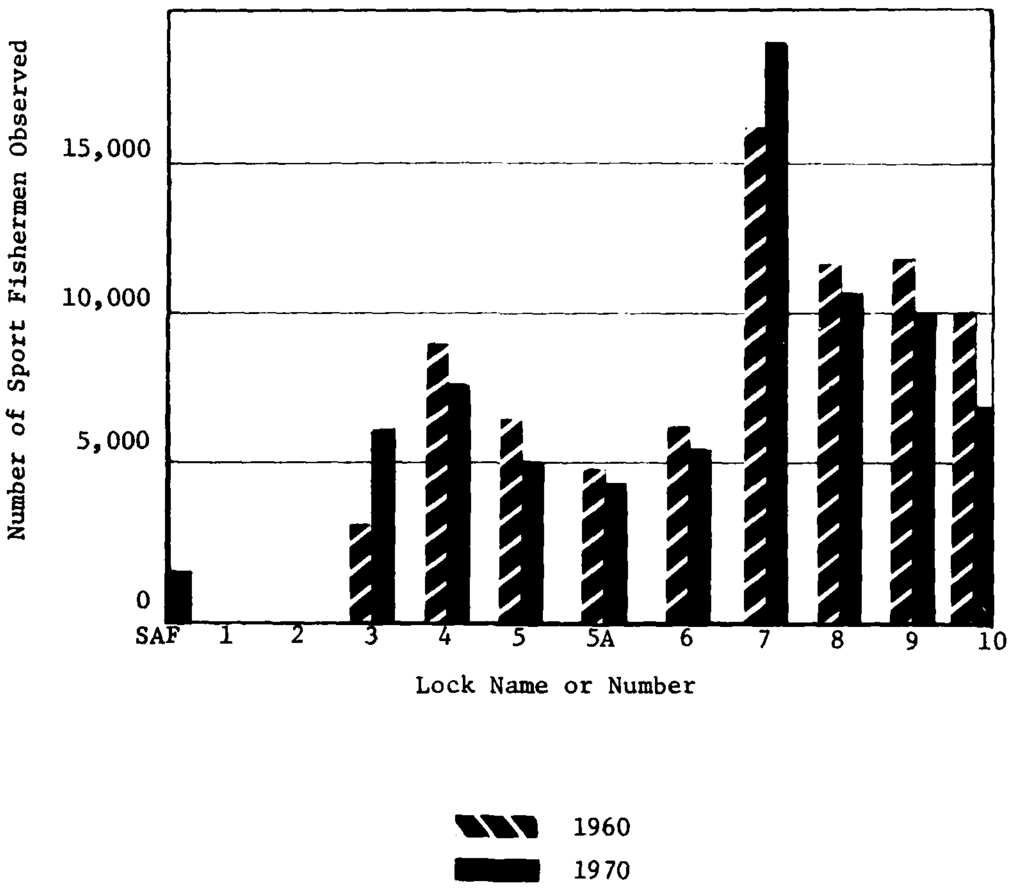
CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 109

PLEASURE BOATS MOVING THROUGH UPPER MISSISSIPPI RIVER
IN 1960 AND 1972

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY ATTENDANTS
FROM LOCK AND DAM SITES ON THE UPPER MISSISSIPPI RIVER IN 1960-1970



CORPS OF ENGINEERS

ST. PAUL DISTRICT

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY ATTENDANTS
FROM LOCK AND DAM SITES ON THE UPPER MISSISSIPPI RIVER IN 1960 - 1970

EXHIBIT 110

COMMERCIAL LOCKAGES IN UPPER AND LOWER
ST. ANTHONY FALLS LOCKS, 1960 - 1972

Year	Commercial Lockages	
	Lock LSAF	Lock USAF
1960	71	0
1961	317	0
1962	69	0
1963	294	253
1964	523	519
1965	1,047	382
1966	1,199	427
1967	1,096	562
1968	1,419	725
1969	1,743	855
1970	1,694	996
1971	1,442	782
1972	2,072	1,335

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 111 COMMERCIAL LOCKAGES IN UPPER AND LOWER ST. ANTHONY FALLS LOCKS, 1960 - 1972

AD-A133 512 OPERATION AND MAINTENANCE 9-FOOT NAVIGATION CHANNEL UPPER MISSISSIPPI RIV..(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT AUG 74

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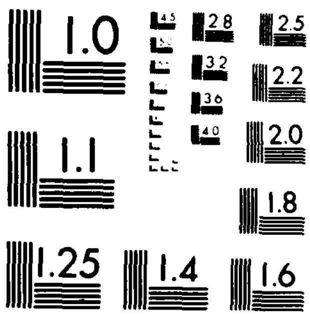


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

PLEASURE BOAT LOCKAGES IN
UPPER AND LOWER ST. ANTHONY FALLS POOLS, 1960-1972

Year	Pleasure Boats Through		Pleasure Boat Lockages Through	
	Lock LSAF	Lock USAF	Lock LSAF	Lock USAF
1960	0	0	0	0
1961	10	0	10	0
1962	1	0	1	0
1963	5	1	5	3
1964	887	879	679	668
1965	402	399	208	292
1966	809	794	581	582
1967	1,024	1,005	732	729
1968	1,218	1,211	881	885
1969	1,134	1,152	769	814
1970	1,482	1,555	1,010	1,014
1971	1,936	1,902	1,226	1,209
1972	1,455	1,458	926	943

CORPS OF ENGINEERS

ST. PAUL DISTRICT

PLEASURE BOAT LOCKAGES IN
UPPER AND LOWER ST. ANTHONY FALLS POOLS, 1960-1972 EXHIBIT 112

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY BOTH ATTENDANTS FROM THE ST. ANTHONY FALLS
1960 - 1970

Year	St. Anthony Falls Lock and Dam
1960	Not Available
1961	Not Available
1962	Not Available
1963	Not Available
1964	2,117
1965	Not Available
1966	Not Available
1967	963
1968	1,162
1969	1,344
1970	1,281

NOTE: Counts are made once each day at 3:00 p.m.

EXHIBIT 113

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY BOTH ATTENDANTS FROM THE ST. ANTHONY FALLS
1960 - 1970

COMMERCIAL LOCKAGES IN POOL 1
1960 - 1972

Year	Commercial Lockages Through...	
	Lock 1	Lock LSAF
1960	1,082	71
1961	1,323	317
1962	995	69
1963	1,367	294
1964	1,688	523
1965	1,571	1,047
1966	1,703	1,199
1967	1,560	1,096
1968	1,748	1,419
1969	1,949	1,743
1970	1,914	1,694
1971	1,765	1,442
1972	2,193	2,072

CORPS OF ENGINEERS

ST. PAUL DISTRICT

COMMERCIAL LOCKAGES IN POOL 1
1960 - 1972

EXHIBIT 114

PLEASURE BOAT LOCKAGES IN POOL 1
1960 - 1972

Year	Pleasure Boats Through		Pleasure-Boat Lockages Through	
	Lock 1	Lock LSAF	Lock 1	Lock LSAF
1960	1,278	0	708	0
1961	1,211	10	838	10
1962	959	1	623	1
1963	1,427	5	856	5
1964	1,890	887	1,155	679
1965	1,121	402	743	208
1966	1,677	809	1,064	581
1967	2,088	1,024	1,221	732
1968	2,193	1,218	1,422	881
1969	2,415	1,134	1,405	769
1970	2,960	1,482	1,861	1,010
1971	3,455	1,936	1,783	1,226
1972	2,798	1,455	1,568	926

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY ATTENDANTS FROM LOCK AND DAM SITES AT
BOTH ENDS OF POOL 1
1964 - 1970

Year	Lock and Dam SAF	Lock and Dam 1
1964	2,117	1,184
1965	Not Available	Not Available
1966	Not Available	Not Available
1967	963	1,108
1968	1,162	1,194
1969	1,344	1,428
1970	1,281	635

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY ATTENDANTS FROM LOCK AND DAM SITES AT
BOTH ENDS OF POOL 1
1964 - 1970

EXHIBIT 116

COMMERCIAL LOCKAGES IN POOL 2
1960 - 1972

Year	Commercial Lockages Through	
	Lock 2	Lock 1
1960	1,302	1,082
1961	1,191	1,323
1962	1,325	995
1963	1,561	1,367
1964	1,556	1,688
1965	1,426	1,571
1966	1,588	1,703
1967	1,727	1,560
1968	1,530	1,748
1969	1,539	1,949
1970	1,853	1,914
1971	1,825	1,765
1972	1,929	2,195

EXHIBIT 117

COMMERCIAL LOCKAGES IN POOL 2
1960 - 1972

COMMERCIAL DOCKS IN POOL 2

Mile	Bank	Terminal	Location	Commodity
814.5	R	G.N. Oil Company Storage	Hastings	Petro. Prod.
823.8	R	Central Farmers Fertilizer Co.	Pine Bend	Phosphate
823.8	R	N.W. Coop Mills	Pine Bend	Fertilizer
824.2	R	CENEX (Central Farmers)	Pine Bend	Phosphate
824.2	R.	G.N. Oil Company Refinery	Pine Bend	Petro. Prod.
825.0	L	J.L. Shiely Company	Grey Cloud	Aggregate
830.0	L	Northwestern Refinery	St. Paul Pk.	Petro. Prod.
830.2	L	Erickson Petroleum Co.	Newport	Petro. Prod.
833.3	R	North Star Steel Company	St. Paul	Asphalt
836.8	L	Industrial Molasses Co.	St. Paul	Molasses
836.9	L	Continental Grain Co.	St. Paul	Grain
837.2	L	J.L. Shiely Company, Yard "A"	St. Paul	Aggregate
837.3	L	Northern Waterway Terminal	St. Paul	Misc. Freight
837.3	L	Municipal Dock	St. Paul	Coal & Misc.
837.4	L	Walsh Grain Elevator	St. Paul	Grain
838.0	R	Twin City Barge & Towing Co.	St. Paul	Vesselyard
838.4	R	Gustavson Oil Company	St. Paul	Petro. Prod.
838.8	R	Minnesota Farm Bureau Co.	St. Paul	Fertilizer
839.0	L	Lambert Landing	St. Paul	Passenger & Landing
839.4	R	AMSCO (Pure Oil Co.)	St. Paul	Chemicals
840.5	R	Barge Cleaning Facilities	St. Paul	Chemicals
840.5	L	NSP Company (High Bridge Plant)	St. Paul	Coal
840.8	L	Pure Oil Company	St. Paul	Petro. Prod.
841.6	L	Clark Oil Company	St. Paul	Petro. Prod.
841.7	L	Archer Daniels Midland Company	St. Paul	Grain
842.2	L	Shell Oil Company	St. Paul	Petro. Prod.
842.3	L	Mobil Oil Company	St. Paul	Petro. Prod.
842.5	L	Texaco Company	St. Paul	Petro. Prod.
843.3	R	J.L. Shiely Company, Yard "B"	St. Paul	Aggregate
843.8	R	Marquette Cement Company	St. Paul	Cement

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 118

COMMERCIAL DOCKS IN POOL 2

PLEASURE BOAT LOCKAGES LOCKS 1 AND 2
1960 - 1972

Year	Pleasure Boats Through		Pleasure Boat Lockages	
	Lock 2	Lock 1	Lock 2	Lock 1
1960	5,137	1,278	2,484	708
1961	5,536	1,211	2,519	838
1962	4,270	959	2,184	623
1963	5,174	1,427	2,412	856
1964	5,107	1,890	2,537	1,155
1965	3,308	1,121	1,827	743
1966	4,423	1,677	2,213	1,064
1967	3,869	2,088	1,981	1,221
1968	4,702	2,193	2,181	1,422
1969	4,189	2,415	1,888	1,405
1970	4,555	2,960	1,953	1,861
1971	5,788	3,455	2,359	1,783
1972	5,723	2,798	2,345	1,568

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 119 PLEASURE BOAT LOCKAGES LOCKS 1 AND 2
1960 - 1972

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 2, 1963 - 1971

Year	Lock and Dam 1	Lock and Dam 2
1963	NA	205
1964	1,184	228
1965	NA	NA
1966	NA	268
1967	1,108	369
1968	1,194	401
1969	1,428	103
1970	635	57
1971	NA	32

CORPS OF ENGINEERS

ST. PAUL DISTRICT

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 2, 1963 - 1971

EXHIBIT 120

POOL 2 VISITATION, 1963

Activity	Annual 1963		Peak Month (July)	
	Percent of Total	Number Partici-pating	Percent of Total	Number Partici-pating
Camping	0	0	0	0
Picnicking	22.7	5,600	27.1	2,020
Boating	13.4	3,300	10.8	800
Fishing	62.7	15,500	61.0	4,600
Water Skiing	0.4	100	0.4	30
Swimming	0.8	200	0.7	50
TOTAL	100.0	24,700	100.0	7,500

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 121 POOL 2 VISITATION, 1963

USAGE AND VALUE OF COMMODITIES MOVING ALONG THE MINNESOTA RIVER

Commodity	Total	Internal Inbound	Internal Outbound
TOTAL	3,626,132	897,659	2,728,473
Barley and Rye	14,839		14,839
Corn	1,358,380		1,358,380
Oats	290,017		290,017
Wheat	465,993		465,993
Soybeans	542,967		542,967
Coal and Lignite	543,155	543,155	
Nonmetallic Minerals, Nec	118,768	118,768	
Grain Mill Products, Nec	21,981		21,981
Molasses	22,756	22,756	
Vegetable Oils, Marg., Short.	32,895		32,895
Nitrogenous Chem Fertilizers	19,265	19,265	
Phosphatic Chem Fertilizers	35,693	35,693	
Fertilizer and Materials, Nec	92,423	91,022	1,401
Residual Fuel Oil	11,012	11,012	
Asphalt, Tar, and Pitches	29,660	29,660	
Iron and Steel Plates, Sheets	16,251	16,251	
Iron and Steel Pipe and Tube	8,301	8,301	
Aluminum and Alloys, Unworked	1,119	1,119	
Fabricated Metal Products	657	657	

TOTAL TON-MILES 50,069,079

CORPS OF ENGINEERS

ST. PAUL DISTRICT

USAGE AND VALUE OF COMMODITIES MOVING ALONG THE MINNESOTA RIVER

EXHIBIT 122

LOCATION OF BARGE TERMINALS, AND COMMODITIES
SHIPPED, ON THE MINNESOTA RIVER

Mile	Location	Company and Commodity
21.8	Shakopee, MN	Peavey Company (grain)
14.7	Port Continental Elevator, Savage, MN	Continental Grain Company
14.3	Port Richards, Savage, MN	Richards Oil Company
14.1	Port Bunge, Savage, MN	Bunge Corporation (grain)
13.9	Port Cargill, Savage, MN	Cargill, Inc. (grain)
11.0	Port Marilyn	U. S. Salt Company
8.5	Black Dog Power Plant	Northern States Power Company (coal)

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 123

LOCATION OF BARGE TERMINALS, AND COMMODITIES
SHIPPED, ON THE MINNESOTA RIVER

ST. CROIX RIVER WATERBORNE TRAFFIC IN 1971

Transportation Mode	Upbound	Downbound
Self-propelled		
Passenger and dry cargo	1,812	1,810
Tanker	0	0
Towboat or tugboat	133	132
Non-self Propelled (Barge)		
Dry cargo	790	787
Tanker	0	0
TOTAL	2,735	2,729

ST. CROIX RIVER WATERBORNE TRAFFIC IN 1971

EXHIBIT 124

POPULARITY OF VARIOUS FORMS OF RECREATION ON
LAKE ST. CROIX IN TERMS OF INTENSITY OF USE (MAN HOURS)

Recreational Activity	Intensity	
Pleasure boating (boat-hours)	91,180	
Water skiing (man hours)	7,416	
Camping (camp nights)	1,005	
Fishing (man hours)	106,280	
Bank		25,611
Boat		76,094
Ice-fishing		4,575

EXHIBIT 125 POPULARITY OF VARIOUS FORMS OF RECREATION ON LAKE ST. CROIX

ACRES OF PRINCIPAL FIELD CROPS HARVESTED AND
POPULATION OF MAJOR TYPES OF LIVESTOCK AND POULTRY
IN THE AREA OF POOL 3

Field Crops	Goodhue County	Dakota County	Pierce County
Corn			
Grain	78,900	55,100	36,900
Silage	13,200	8,200	10,800
Oats	45,400	30,100	38,200
Barley	2,500	500	1,050
Wheat	3,000	4,800	750
Soybeans	51,200	34,100	4,400
Hay	59,300	28,600	57,300
Total Acreage	254,400	161,400	149,400
% of Farm Acreage	65.5	65.8	48.3
Livestock and Poultry			
Cattle	84,000	45,400	76,000
Hogs	49,100	36,400	32,000
Sheep	11,200	2,900	3,900
Chickens	93,000	100,000	121,000

CORPS OF ENGINEERS

ST. PAUL DISTRICT

ACRES OF PRINCIPAL FIELD CROPS HARVESTED AND POPULATION
OF MAJOR TYPES OF LIVESTOCK AND POULTRY
IN THE AREA OF POOL 3

EXHIBIT 126

COMMERCIAL LOCKAGES IN POOL 3
1960 - 1972

Year	Lock 3	Lock 2
1960	1,303	1,302
1961	1,318	1,191
1962	1,302	1,325
1963	1,468	1,561
1964	1,463	1,556
1965	1,292	1,426
1966	1,568	1,588
1967	1,499	1,727
1968	1,558	1,530
1969	1,636	1,539
1970	1,576	1,853
1971	1,860	1,825
1972	1,931	1,929

EXHIBIT 127 COMMERCIAL LOCKAGES IN POOL 3
1960 - 1972

POOL 3 WATERBORNE TRAFFIC IN 1971

Transportation Mode	Upbound	Downbound
Self Propelled		
Passenger and dry cargo	1,900	1,875
Tanker	3	2
Towboat or tugboat	8,433	8,419
Non-Self Propelled		
Dry cargo	25,250	25,237
Tanker	7,312	7,311
TOTAL	42,898	42,844

POOL 3 WATERBORNE TRAFFIC IN 1971

EXHIBIT 128

POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN IN POOL 3 OF THE UPPER MISSISSIPPI RIVER, 1960 - 1969

Year	Commercial Fish Catch
1960	119,000
1961	104,000
1962	46,000
1963	39,000
1964	89,000
1965	Not Available
1966	21,000
1967	46,000
1968	363,000
1969	129,000

EXHIBIT 129 POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN IN POOL 3 OF THE UPPER MISSISSIPPI RIVER 1960 - 1969

PLEASURE BOAT LOCKAGES
LOCKS 2 AND 3, 1960 -- 1972

Year	Pleasure Boats Through		Pleasure Boat Lockages Through	
	Lock 3	Lock 2	Lock 3	Lock 2
1960	5,486	5,137	2,760	2,484
1961	5,490	5,536	2,748	2,519
1962	4,501	4,270	2,372	2,184
1963	5,113	5,174	2,497	2,412
1964	4,784	5,107	2,488	2,537
1965	4,139	3,308	2,096	1,827
1966	5,379	4,423	2,377	2,213
1967	4,519	3,869	2,528	1,981
1968	3,992	4,702	2,385	2,181
1969	3,747	4,189	2,499	1,888
1970	6,641	4,555	3,258	1,953
1971	8,051	5,788	3,282	2,359
1972	8,102	5,723	3,252	2,354

CORPS OF ENGINEERS

ST. PAUL DISTRICT

PLEASURE BOAT LOCKAGES
LOCKS 2 AND 3, 1960 - 1972

EXHIBIT 130

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY BOTH ATTENDANTS FROM LOCK AND DAM SITES OF
BOTH ENDS OF POOL 3, 1960 - 1970

Year	Lock and Dam 2	Lock and Dam 3
1960	Not Available	2,627
1961	Not Available	3,284
1962	Not Available	2,733
1963	Not Available	2,596
1964	228	2,830
1965	Not Available	Not Available
1966	Not Available	Not Available
1967	369	2,510
1968	401	3,013
1969	103	2,714
1970	57	5,752

EXHIBIT 131 NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY BOTH ATTENDANTS FROM LOCK AND DAM SITES OF
BOTH ENDS OF POOL 3, 1960 - 1970

COMMERCIAL LOCKAGES IN POOL 4
1960 - 1972

Year	Commercial Lockages Through...	
	Lock 4	Lock 3
1960	1,313	1,303
1961	1,294	1,318
1962	1,313	1,302
1963	1,373	1,468
1964	1,410	1,463
1965	1,373	1,292
1966	1,519	1,568
1967	1,593	1,499
1968	1,485	1,558
1969	1,599	1,636
1970	1,862	1,576
1971	1,259	1,860
1972	1,913	1,931

CORPS OF ENGINEERS
ST. PAUL DISTRICT

COMMERCIAL LOCKAGES IN POOL 4
1960 - 1972

EXHIBIT 132

POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN IN POOL 4
1960 - 1969

Year	Commercial Fish Catch
1960	1,629,000
1961	1,737,000
1962	1,836,000
1963	2,183,000
1964	2,593,000
1965	Not Available
1966	2,390,000
1967	2,250,000
1968	1,891,000
1969	1,498,000

EXHIBIT 133

POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN IN POOL 4
1960 - 1969

PLEASURE BOAT LOCKAGES
LOCKS 3 AND 4, 1960 - 1972

Year	Pleasure Boats Through		Pleasure Boat Lockages Through	
	Lock 4	Lock 3	Lock 4	Lock 3
1960	4,305	5,486	2,498	2,760
1961	4,361	5,490	2,400	2,748
1962	3,943	4,501	2,202	2,372
1963	4,225	5,113	2,472	2,497
1964	4,347	4,784	2,633	2,488
1965	3,621	4,139	2,108	2,096
1966	4,276	5,379	2,662	2,377
1967	4,179	4,519	2,519	2,528
1968	4,281	3,992	2,481	2,385
1969	4,523	3,747	2,485	2,499
1970	5,144	6,641	2,832	3,258
1971	6,086	8,051	3,613	3,282
1972	6,488	8,102	3,153	3,252

CORPS OF ENGINEERS
ST. PAUL DISTRICT

PLEASURE BOAT LOCKAGES
LOCKS 3 AND 4, 1960 - 1972

EXHIBIT 134

MAJOR EXISTING PUBLIC-USE FACILITIES - POOL 4

Site	River Mile	River Bank	Developed by	Managed by	Landowner	Ramp Number of lanes	Ramp Surface	Parking Number of spaces	Parking Surface	Other facilities or remarks
On Corps of Engineers Lands										
Indian Slough Landing	760.2	L	Bureau Sport Fisheries & Wildlife and Wisconsin Highway Commission	Bureau Sport Fisheries & Wildlife	Corps of Engineers	3	Gravel	30	Blacktop	On Nelson-Wabasha causeway.
Pontoon Slough Landing	760.2	L	Bureau Sport Fisheries & Wildlife and Wisconsin Highway Commission	Bureau Sport Fisheries & Wildlife	Corps of Engineers	2	Gravel	30	Blacktop	On Nelson-Wabasha causeway
Beef River Landing	755.4	L	Bureau Sport Fisheries & Wildlife	Bureau Sport Fisheries & Wildlife	Corps of Engineers	3	Gravel	20	Gravel	Mondovi Rod and Gun Club shared in initial development
Peicks Park - picnic and campgrounds	755.3	L	City of Alma, Wisconsin	Alma Rod and Gun Club	Corps of Engineers	1	Gravel - deteriorated	10	Gravel	Adjacent wayside area is leased to Wisconsin Highway Commission.
On Bureau of Sport Fisheries and Wildlife Lands										
Beef Slough Landing	760.2	L	Bureau Sport Fisheries & Wildlife and Wisconsin Highway Commission	Bureau Sport Fisheries & Wildlife	Bureau Sport Fisheries & Wildlife	3	Gravel	30	Blacktop	On Nelson-Wabasha causeway.
Peterson Lake Landing	754.4	R	Bureau Sport Fisheries & Wildlife	Bureau Sport Fisheries & Wildlife	Bureau Sport Fisheries & Wildlife	2	Gravel	20	Gravel	
Alma Small-Boat Harbor (Corps of Engineers project)	754.0	L	Corps of Engineers	City of Alma, Wisconsin	Bureau Sport Fisheries & Wildlife	2	Crushed rock	30	Crushed rock	Easement for road access by Corps of Engineers. Launching facilities by city of Alma.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 135

MAJOR EXISTING PUBLIC-USE FACILITIES POOL 4

POOL 4 TOTAL VISITATION - 1963

Activity	Annual 1963		Peak Periods		
	Percent of Total	Activity Participation	Percent of Total	Activity Participation Month (July)	Activity Participation Peak Day
Camping	6.1	21,960	7.8	6,710	510
Picnicking	8.8	31,680	10.5	9,030	680
Boating	30.6	110,160	35.2	30,270	2,290
Fishing	47.0	169,200	38.6	33,200	2,510
Water Skiing	2.5	9,000	3.1	2,660	200
Swimming	4.0	14,400	4.8	4,130	310
Subtotal	99.0	356,400	100.0	86,000	6,500
Hunting	1.0	3,600		2,520(Oct)	190
Total Annual	100.0	360,000			

CORPS OF ENGINEERS

ST. PAUL DISTRICT

POOL 4 TOTAL VISITATION - 1963

EXHIBIT 136

RECREATIONAL VISITS TO POOLS 4, 5, 5A, and 6 FOR 1971
(WINONA DISTRICT OF THE UPPER MISSISSIPPI RIVER
WILDLIFE AND FISH REFUGE)

Recreational Activity	Number of Visits in 1971	
Fishing		69,080
Hunting		
Ducks	18,910	
Deer	450	
Other	400	
TOTAL		19,760
Miscellaneous		
Water Sport - Camping Activities[a]	89,155	
Bird Watching, Wildlife Observation and Wildlife Photography	9,000	
TOTAL		98,155
TOTAL		186,995[b]

[a]Includes boating, sandbar picnicking, water skiing, swimming, and camping.

[b]Total does not include 8,290 trapping visits and 2,305 visits by Commercial Fishermen.

EXHIBIT 137 RECREATIONAL VISITS TO POOLS 4, 5, 5A, and 6 FOR 1971
(WINONA DISTRICT OF THE UPPER MISSISSIPPI RIVER
WILDLIFE AND FISH REFUGE)

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY
ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 4

Year	Lock and Dam 3	Lock and Dam 4
1960	2,627	8,178
1961	3,284	7,110
1962	2,733	6,863
1963	2,596	6,480
1964	2,830	7,076
1965	Not Available	Not Available
1966	Not Available	Not Available
1967	2,510	5,688
1968	3,013	6,194
1969	2,714	10,378
1970	5,752	7,030

CORPS OF ENGINEERS

ST. PAUL DISTRICT

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY
ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 4

EXHIBIT 138

COMMERCIAL LOCKAGES IN POOL 5
1960 - 1972

Year	Commercial Lockages	
	Lock 5	Lock 4
1960	1,305	1,313
1961	1,307	1,294
1962	1,464	1,313
1963	1,558	1,373
1964	1,486	1,410
1965	1,592	1,373
1966	1,696	1,519
1967	1,595	1,593
1968	862	1,485
1969	1,572	1,599
1970	1,894	1,862
1971	1,888	1,259
1972	1,950	1,913

POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL
FISHERMEN IN POOL 5
1960 - 1969

Year	Commercial Fish Catch
1960	163,300
1961	218,800
1962	178,000
1963	147,300
1964	164,900
1965	129,700
1966	61,500
1967	62,000
1968	49,000
1969	92,800

CORPS OF ENGINEERS

ST. PAUL DISTRICT

POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL
FISHERMEN IN POOL 5
1960 - 1969

EXHIBIT 140

PLEASURE BOAT LOCKAGES
LOCKS 4 AND 5, 1960 - 1972

Year	Pleasure Boats Through		Pleasure Boat Lockages Through	
	Lock 5	Lock 4	Lock 5	Lock 4
1960	2,846	4,305	1,715	2,498
1961	2,919	4,361	1,722	2,400
1962	3,295	3,943	1,958	2,202
1963	3,202	4,225	1,820	2,472
1964	3,192	4,347	1,967	2,633
1965	3,034	3,621	1,671	2,108
1966	3,422	4,276	2,112	2,662
1967	3,132	4,179	2,033	2,519
1968	3,297	4,281	2,591	2,481
1969	3,408	4,523	1,933	2,485
1970	3,891	5,144	2,152	2,832
1971	4,768	6,086	2,476	3,613
1972	5,270	6,488	2,653	3,153

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 141

PLEASURE BOAT LOCKAGES
LOCKS 4 AND 5, 1960-1972

RESULTS OF TWO SPORT FISHERY SURVEYS ON POOL 5
1962 - 1963 AND 1967 - 1968

SOURCES: The 1962-1963 data are from Robert C. Nord, The 1962-1963 Sport Fishery Survey of the Upper Mississippi River (LaCross, Wisconsin: Upper Mississippi Conservation Committee; October 6, 1964). The 1967-1968 data are from Kenneth J. Wright, The 1967-1968 Sport Fishery Survey of the Upper Mississippi River (LaCrosse, Wisconsin: Upper Mississippi Conservation Committee; October 1, 1970).

Measure of Comparison	1962-1963	1967-1968
Project Number of Fishing Hours Annually	157,112	186,234
% Breakdown of Fishing Hours:		
a. Boat	23%	34%
b. Bank	9%	16%
c. Barge	39%	24%
d. Ice	29%	26%
TOTAL	100%	100%
% Breakdown of Fish Chiefly Sought		
a. Bluegill, Crappie, and Sunfish	55%	43%
b. Walleye and Sauger	20%	27%
c. Northern Pike	11%	16%
d. Other	14%	14%
TOTAL	100%	100%
Project Breakdown of Fish Caught Annually (In Fish)		
a. Bluegill, Crappie, and Sunfish	148,000	84,000
b. Walleye and Sauger	18,000	19,000
c. Northern Pike	3,000	6,000
d. Other	27,000	25,000
TOTAL (Fish)	196,000	134,000
Catch Rates (Fish Caught per Manhour)		
a. Boat	1.557	0.708
b. Bank	0.703	0.578
c. Barge	0.669	0.565
d. Ice	1.937	0.966
ANNUAL AVERAGE	1.245	0.720
Estimated Annual Recreational Value		
a. Fishing trips	39,568	51,786
b. Value at $1.90 per Trip	$59,352	$77,679

CORPS OF ENGINEERS
ST. PAUL DISTRICT

RESULTS OF TWO SPORT FISHERY SURVEYS ON POOL 5
1962 - 1963 AND 1967 - 1968

EXHIBIT 142

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY BOTH ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 5, 1960 - 1970

Year	Lock and Dam 4	Lock and Dam 5
1960	8,178	5,737
1961	7,110	5,527
1962	6,863	7,530
1963	6,480	4,936
1964	7,076	4,883
1965	Not Available	Not Available
1966	Not Available	Not Available
1967	5,688	5,741
1968	6,194	6,069
1969	10,378	9,664
1970	7,030	4,848

EXHIBIT 143

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY BOTH ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 5, 1960 - 1970

POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL
FISHERMEN IN POOL 5A
1960 - 1969

Year	Commercial Fish Catch
1960	145,000
1961	72,000
1962	120,000
1963	105,000
1964	110,000
1965	Not Available
1966	104,000
1967	112,000
1968	277,000
1969	239,000

CORPS OF ENGINEERS
ST. PAUL DISTRICT

POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL
FISHERMEN IN POOL 5A
1960 - 1969

EXHIBIT 144

PLEASURE BOAT LOCKAGES
LOCKS 5 AND 5A, 1960 - 1972

Year	Pleasure Boats Through		Pleasure Boat Lockages Through	
	Lock 5A	Lock 5	Lock 5A	Lock 5
1960	7,421	2,846	3,860	1,715
1961	7,932	2,919	4,230	1,722
1962	6,389	3,295	3,379	1,958
1963	7,128	3,202	3,783	1,820
1964	7,158	3,192	3,794	1,967
1965	5,111	3,034	2,819	1,671
1966	6,350	3,422	3,690	2,112
1967	5,858	3,132	3,356	2,033
1968	6,065	3,297	3,527	2,591
1969	6,261	3,408	3,316	1,933
1970	7,124	3,891	3,832	2,152
1971	8,057	4,768	3,809	2,476
1972	7,768	5,270	3,801	2,653

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY BOTH ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 5A, 1960 - 1970

Year	Lock and Dam 5	Lock and Dam 5A
1960	5,737	3,945
1961	5,527	4,146
1962	7,530	3,682
1963	4,936	3,909
1964	4,883	4,246
1965	Not Available	Not Available
1966	Not Available	Not Available
1967	5,741	3,301
1968	6,069	3,405
1969	9,664	4,656
1970	4,848	3,829

CORPS OF ENGINEERS

ST. PAUL DISTRICT

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY BOTH ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 5A, 1960 - 1970

EXHIBIT 146

POOL 5A TOTAL VISITATION - 1963

Activity	Annual 1963 Percent of Total	Annual 1963 Activity Participation	Peak Periods Percent of Total	Peak Periods Activity Participati[on] Month(July)	Peak Periods Activity Participati[on] Peak Day
Camping	1.6	1,760	2.0	550	45
Picnicking	5.0	5,500	6.2	1,710	130
Boating	38.2	42,020	42.0	11,550	870
Fishing	49.7	54,670	45.7	12,560	950
Water Skiing	1.2	1,320	1.6	440	35
Swimming	2.3	2,530	2.5	690	50
SUBTOTAL	98.0	107,800	100.0	27,500	2,080
Hunting	2.0	2,200		1,650(Oct)	125(Oct)
Total Annual	100.0	110,000			

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 147

POOL 5A TOTAL VISITATION - 1963

COMMERCIAL DOCKS IN POOL 6 AND PRODUCTS THEY HANDLE

Commercial Dock	River Footage	Mile Location	Commodities Handled
Peavey Company	425 feet	726.5 R	Corn, wheat, soybeans oats
Bay State Milling Company	400 feet	725.2 R	Grain and flour
Northern States Power Company	193 feet	725.1 R	Coal
Municipal Terminal	100 feet	724.6 R	Scrap iron, fertilizer, wheat, flour
Standard Oil Company		724.5 R	Petroleum products
Shell Oil Company	3 city blocks	724.4 R	Petroleum products
Western Oil Company		724.1 R	Petroleum products
N. W. Hanna Coal Dock		723.9 R	Coal

COMMERCIAL DOCKS IN POOL 6 AND PRODUCTS THEY HANDLE

EXHIBIT 148

COMMERCIAL LOCKAGES IN POOL 6
1960 - 1972

Year	Commercial Lockages	
	Lock 6	Lock 5A
1960	1,295	1,657
1961	1,281	1,189
1962	1,368	1,479
1963	1,544	1,725
1964	1,483	1,717
1965	1,425	1,534
1966	1,658	1,662
1967	1,724	1,773
1968	1,244	1,637
1969	1,500	1,529
1970	1,918	1,984
1971	1,945	1,971
1972	2,018	2,127

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 149

COMMERCIAL LOCKAGES IN POOL 6
1960-1972

POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN
IN POOL 6
1960 - 1969

Year	Commercial Fish Catch
1960	99,000
1961	126,000
1962	90,000
1963	128,000
1964	135,000
1965	Not Available
1966	82,000
1967	63,000
1968	101,000
1969	44,000

PLEASURE BOAT LOCKAGES
LOCKS 5A AND 6, 1960 - 1972

Year	Pleasure Boats Through		Pleasure Boat Lockages Through	
	Lock 6	Lock 5A	Lock 6	Lock 5A
1960	3,697	7,421	2,351	3,860
1961	3,828	7,932	2,312	4,230
1962	3,591	6,389	2,096	3,379
1963	4,095	7,128	2,527	3,783
1964	4,484	7,158	2,739	3,794
1965	3,505	5,111	2,124	2,819
1966	4,291	6,350	2,657	3,690
1967	4,317	5,858	2,666	3,356
1968	5,010	6,065	3,387	3,527
1969	3,772	6,261	2,273	3,316
1970	4,137	7,124	2,386	3,832
1971	4,734	8,057	2,641	3,809
1972	5,823	7,768	3,312	3,801

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 151

PLEASURE BOAT LOCKAGES
LOCKS 5A AND 6, 1960 - 1972

POOL 6 TOTAL VISITATION - 1963

Activity	Annual 1963 Percent of Total	Annual 1963 Activity Participation	Peak Periods Percent of Total	Peak Periods Activity Participation Month(July)	Peak Periods Activity Participation Peak Day
Camping	1.0	1,100	1.2	345	25
Picnicking	3.6	3,960	4.1	1,170	90
Boating	45.2	49,720	49.0	14,015	1,050
Fishing	45.0	49,500	40.3	11,525	865
Water Skiing	1.4	1,540	1.8	515	40
Swimming	2.8	3,080	3.6	1,030	80
SUBTOTAL	99.0	108,900	100.0	28,600	2,150
Hunting	1.0	1,100		700(Oct)	60(Oct)
Total Annual	100.0	110,000			

POOL 6 TOTAL VISITATION - 1963

EXHIBIT 152

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY BOTH ATTENDANTS FROM LOCK AND DAM SITES
AT BOTH ENDS OF POOL 6, 1960 - 1970

Year	Lock and Dam 5A	Lock and Dam 6
1960	3,945	5,179
1961	4,146	4,567
1962	3,682	5,230
1963	3,909	4,907
1964	4,246	5,584
1965	Not Available	Not Available
1966	Not Available	Not Available
1967	3,301	7,463
1968	3,405	6,466
1969	4,656	6,666
1970	3,829	4,744

EXHIBIT 153

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY BOTH ATTENDANTS FROM LOCK AND DAM SITES
AT BOTH ENDS OF POOL 6, 1960 - 1970

COMMERCIAL LOCKAGES IN POOL 7
1960 - 1972

Year	Commercial Lockages	
	Lock 7	Lock 6
1960	1,324	1,295
1961	1,212	1,281
1962	1,660	1,368
1963	2,038	1,544
1964	1,977	1,483
1965	1,756	1,425
1966	1,982	1,658
1967	1,953	1,724
1968	1,957	1,244
1969	1,653	1,500
1970	2,265	1,918
1971	2,270	1,945
1972	2,429	2,018

COMMERCIAL LOCKAGES IN POOL 7
1960 - 1972

EXHIBIT 154

POUNDS OF FISH CAUGHT ANNUALLY
BY COMMERCIAL FISHERMEN IN POOL 7
1960 - 1969

Year	Commercial Fish Catch
1960	283,000
1961	416,000
1962	721,000
1963	530,000
1964	458,000
1965	Not Available
1966	259,000
1967	517,000
1968	528,000
1969	242,000

EXHIBIT 155

POUNDS OF FISH CAUGHT ANNUALLY BY
COMMERCIAL FISHERMEN IN POOL 7
1960 - 1969

PLEASURE BOAT LOCKAGES AT LOCKS 6 AND 7
1960 - 1972

Year	Pleasure Boats Through		Pleasure Boat Lockages Through	
	Lock 7	Lock 6	Lock 7	Lock 6
1960	6,849	3,697	3,528	2,351
1961	8,041	3,828	4,100	2,312
1962	7,152	3,591	3,673	2,096
1963	8,337	4,095	3,836	2,527
1964	8,603	4,484	4,216	2,739
1965	6,226	3,505	3,207	2,124
1966	8,239	4,291	4,208	2,657
1967	6,879	4,317	3,620	2,666
1968	6,806	5,010	3,664	3,387
1969	6,535	3,772	3,193	2,273
1970	7,339	4,137	3,674	2,386
1971	8,281	4,734	3,307	2,641
1972	9,184	5,823	4,164	3,312

CORPS OF ENGINEERS

ST. PAUL DISTRICT

PLEASURE BOAT LOCKAGES AT LOCKS 6 AND 7
1960 - 1972

EXHIBIT 156

POOL 7 VISITATION - 1963

Activity	Annual 1963		Peak Month (July)	
	Percent of Total	Activity Participation	Percent of Total	Activity Participation
Camping	0.94	1,500	1.5	650
Picnicking	3.68	5,900	6.2	2,675
Boating	37.50	60,000	38.2	16,500
Fishing	51.20	81,900	49.5	21,385
Hunting	4.00	6,400		
Water Skiing	0.38	600	0.6	260
Swimming	2.30	3,700	4.0	1,730
TOTAL	100.00	160,000	100.0	43,200

EXHIBIT 157

POOL 7 VISITATION - 1963

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY BOTH ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 7, 1960 - 1970

Year	Lock and Dam	Lock and Dam
1960	5,179	15,868
1961	4,567	11,819
1962	5,230	10,551
1963	4,907	8,006
1964	5,586	9,054
1965	Not Available	Not Available
1966	Not Available	Not Available
1967	7,463	12,442
1968	6,466	13,421
1969	6,666	16,040
1970	4,744	18,483

CORPS OF ENGINEERS

ST. PAUL DISTRICT

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY BOTH ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 7, 1960 - 1970

EXHIBIT 158

COMMERCIAL LOCKAGES IN POOL 8
1960 - 1972

Year	Commercial Lockages Through	
	Lock 8	Lock 7
1960	1,670	1,324
1961	1,432	1,212
1962	1,405	1,660
1963	1,600	2,038
1964	2,090	1,977
1965	1,748	1,756
1966	1,631	1,982
1967	1,678	1,953
1968	1,661	1,957
1969	1,625	1,653
1970	1,951	2,265
1971	2,208	2,270
1972	2,135	2,429

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 159

COMMERCIAL LOCKAGES IN POOL 8
1960 - 1972

COMMERCIAL FISHING, AVERAGE CATCH PER UNIT EFFORT
WITH SETLINES, GILL NETS, AND SEINES, AND TOTAL POUNDS
CAUGHT PER YEAR NAVIGATION POOL NUMBER 8

Year	Set Line	Gill Net	Seine	Total Pounds
1953	10.80	0.13	0.48	375,080
1954	10.00	0.22	0.31	369,220
1955	16.06	0.16	0.55	436,420
1956	7.45	0.20	0.67	462,983
1957	10.86	0.13	0.49	93,559
1958	9.47	0.19	0.48	487,154
1959	12.47	0.23	0.90	633,991
1960	11.12	0.25	1.68	764,697
1961	13.66	0.35	0.90	921,613
1962	8.98	0.11	2.20	1,144,425
1963	12.35	0.14	1.50	645,545
1964	13.94	0.16	2.42	1,063,069
1965	12.44	0.21	5.23	860,506
1966	14.59	0.20	3.28	790,679
1967	14.93	0.15	5.10	860,269
1968	15.24	0.17	8.66	670,758
1969	15.73	0.20	3.96	[illegible]53,622
1970	16.46	0.29	6.14	782,864
1971	20.41	0.28	7.00	1,019,762

CORPS OF ENGINEERS
ST. PAUL DISTRICT

COMMERCIAL FISHING, POOL 8

EXHIBIT 160

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 8
1960 - 1970

Year	Lock and Dam 7	Lock and Dam 8
1960	15,868	11,690
1961	11,819	10,139
1962	10,551	12,084
1963	8,056	11,514
1964	9,054	12,557
1965	Not Available	Not Available
1966	Not Available	Not Available
1967	12,442	11,768
1968	13,421	14,567
1969	16,040	17,377
1970	18,483	10,773

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 161

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 8
1960 - 1970

COMMERCIAL LOCKAGES OF POOL 9
1960-1972

Year	Commercial Lockages		Total Lockages	
	Lock 8	Lock 9	Lock 8	Lock 9
1960	1,670	1,606	4,170	4,283
1961	1,432	1,538	3,844	4,485
1962	1,405	1,646	3,991	4,017
1963	1,600	1,627	5,034	4,412
1964	2,090	1,754	5,126	4,733
1965	1,748	1,351	4,127	3,335
1966	1,631	1,724	4,026	4,358
1967	1,678	1,776	4,111	4,156
1968	1,661	1,748	3,953	4,214
1969	1,625	1,823	3,850	3,904
1970	1,951	2,101	4,376	4,360
1971	2,208	2,324	4,726	4,739
1972	2,135	2,336	5,075	4,974

CORPS OF ENGINEERS
ST. PAUL DISTRICT

COMMERCIAL LOCKAGES OF POOL 9
1960-1972

EXHIBIT 162

POUNDS OF FISH CAUGHT ANNUALLY BY
COMMERCIAL FISHERMEN IN POOL 9
1960 - 1969

Year	Commercial Fish Catch
1960	1,410,000
1961	1,227,000
1962	1,437,000
1963	1,523,000
1964	2,025,000
1965	Not Available
1966	2,172,000
1967	1,886,000
1968	1,837,000
1969	2,010,000

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 163

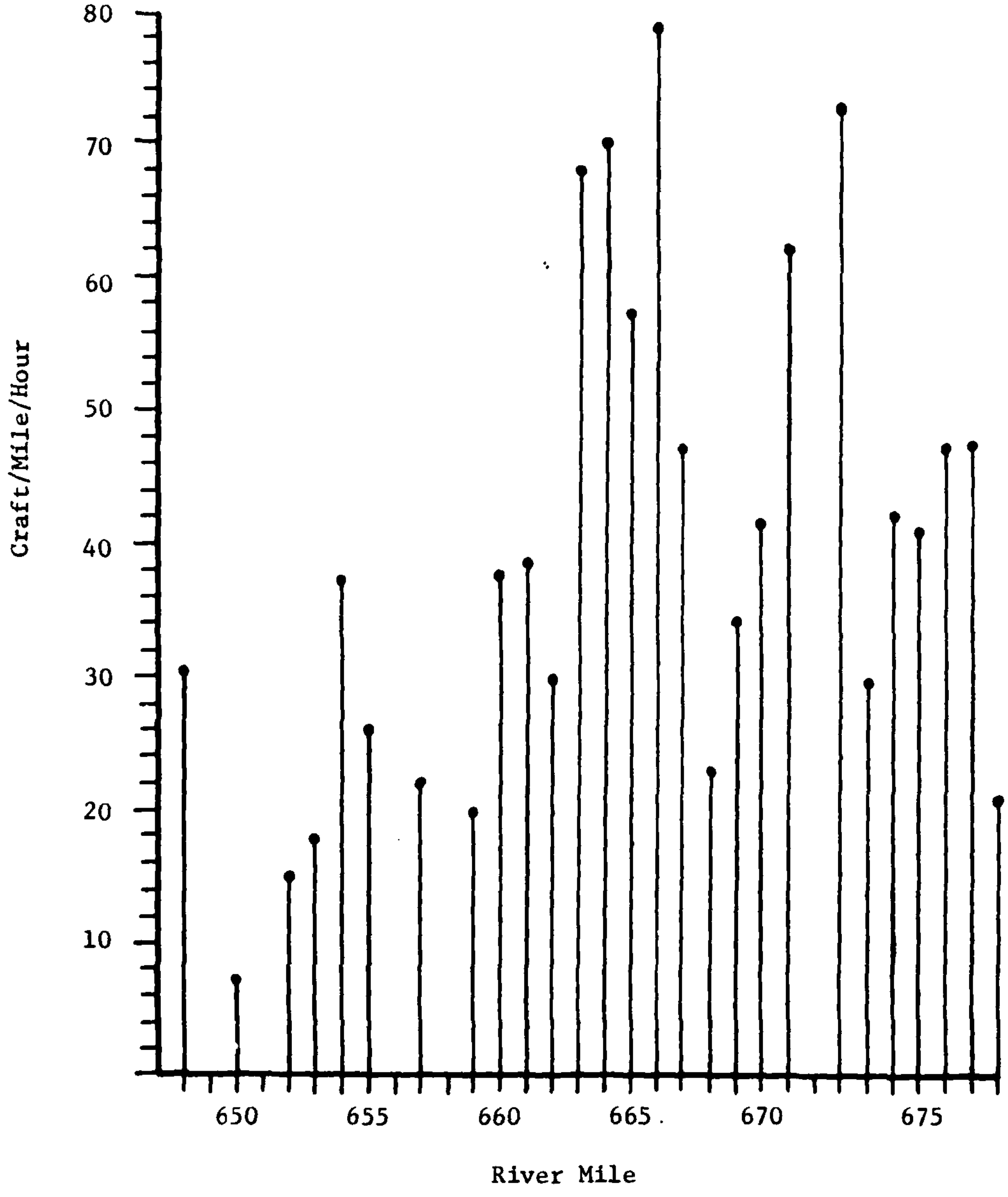
POUNDS OF FISH CAUGHT ANNUALLY BY
COMMERCIAL FISHERMEN IN POOL 9

1960 - 1969

PLEASURE-BOAT LOCKAGES OF POOL 9

Year	Pleasure Boats Through		Pleasure-Boat Lockages Through	
	Lock 8	Lock 9	Lock 8	Lock 9
1960	4,069	5,186	2,500	2,677
1961	3,719	5,596	2,412	2,947
1962	3,683	4,333	2,586	2,371
1963	5,157	5,243	3,434	2,785
1964	4,893	5,468	3,036	2,979
1965	3,694	3,935	2,379	1,984
1966	3,827	4,816	2,395	2,634
1967	3,943	4,445	2,433	2,380
1968	3,523	4,370	2,292	2,466
1969	4,159	4,131	2,225	2,081
1970	4,749	4,430	2,425	2,259
1971	5,368	4,983	2,518	2,415
1972	5,569	5,465	2,940	2,638

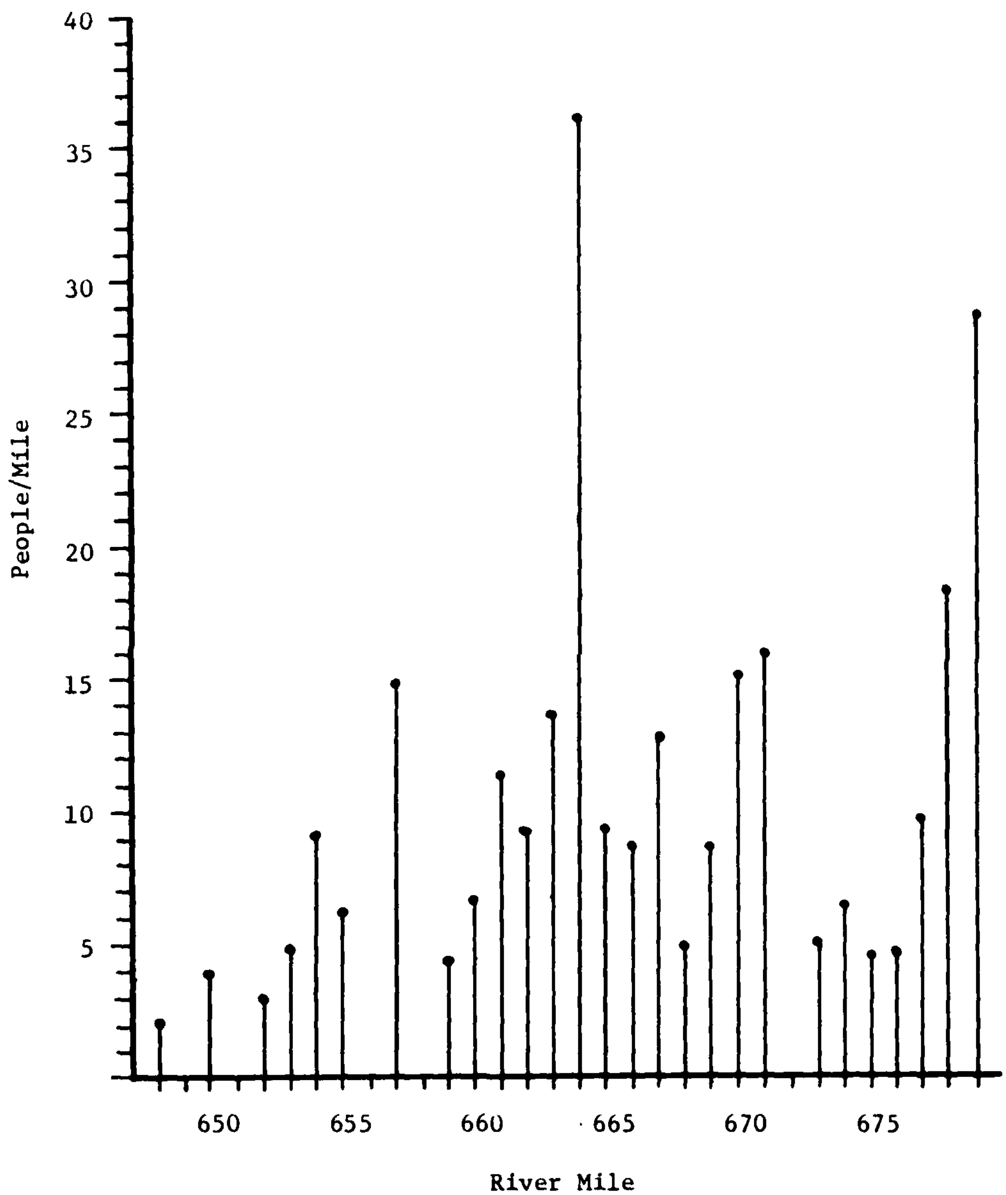
AVERAGE NUMBER OF RIVER CRAFT OF ALL TYPES PER MILE OF RIVER
IN POOL 9, UPPER MISSISSIPPI RIVER, DURING JULY 1973 SURVEY PERIOD



CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 165 AVERAGE NUMBER OF RIVER CRAFT OF ALL TYPES PER MILE OF RIVER IN POOL 9, UPPER MISSISSIPPI RIVER DURING JULY 1973 SURVEY PERIOD

AVERAGE NUMBER OF RIVER USERS PER MILE OF RIVER IN
POOL 9, UPPER MISSISSIPPI RIVER, DURING JULY 1973 SURVEY PERIOD



CORPS OF ENGINEERS

ST. PAUL DISTRICT

AVERAGE NUMBER OF RIVER USERS PER MILE OF RIVER IN
POOL 9, UPPER MISSISSIPPI RIVER
DURING JULY 1973 SURVEY PERIOD

EXHIBIT 166

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY ATTENDANTS FROM LOCK AND DAM SITES AT
BOTH ENDS OF POOL 9
1960 - 1970

Year	Lock and Dam 8	Lock and Dam 9
1960	11,690	11,997
1961	10,139	10,777
1962	12,084	9,648
1963	11,514	12,208
1964	12,557	11,478
1965	Not Available	Not Available
1966	Not Available	Not Available
1967	11,768	12,404
1968	14,567	13,846
1969	17,377	9,187
1970	10,773	10,327

NOTE: Counts are made once each day at 3:00 p.m.

EXHIBIT 167

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 9
1960 - 1970

COMMERCIAL LOCKAGES IN POOL 10
1960 - 1972

Year	Lock and Dam 10	Lock and Dam 9
1960	1,621	1,606
1961	1,392	1,538
1962	1,487	1,646
1963	2,082	1,627
1964	1,968	1,754
1965	1,641	1,351
1966	2,345	1,724
1967	2,156	1,776
1968	1,813	1,748
1969	1,885	1,823
1970	2,349	2,101
1971	2,327	2,324
1972	2,372	2,336

COMMERCIAL LOCKAGES IN POOL 10
1960 - 1972

EXHIBIT 168

POUNDS OF FISH CAUGHT ANNUALLY BY
COMMERCIAL FISHERMEN IN POOL 10
1960 - 1969

Year	Commercial Fish Catch
1960	405,000
1961	625,000
1962	296,000
1963	396,000
1964	518,000
1965	Not Available
1966	564,000
1967	580,000
1968	644,000
1969	663,000

EXHIBIT 169

POUNDS OF FISH CAUGHT ANNUALLY BY
COMMERCIAL FISHERMEN IN POOL 10
1960 - 1969

PLEASURE BOAT LOCKAGES
LOCKS 9 AND 10, 1960 - 1972

Year	Pleasure Boats Through		Pleasure-Boat Lockages Through	
	Lock 10	Lock 9	Lock 10	Lock 9
1960	5,654	5,186	2,729	2,677
1961	5,870	5,596	3,100	2,947
1962	5,097	4,333	2,763	2,371
1963	6,218	5,243	3,209	2,785
1964	6,720	5,468	3,460	2,979
1965	4,326	3,935	2,485	1,984
1966	5,919	4,816	2,614	2,634
1967	4,957	4,445	2,548	2,380
1968	5,575	4,370	3,105	2,466
1969	5,405	4,131	2,841	2,081
1970	6,166	4,430	3,086	2,259
1971	6,076	4,983	2,986	2,415
1972	6,196	5,465	3,206	2,638

CORPS OF ENGINEERS

ST. PAUL DISTRICT

PLEASURE BOAT LOCKAGES
LOCKS 9 AND 10, 1960 - 1972

EXHIBIT 170

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY
BY BOTH ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 10
1960 - 1970

Year	Lock and Dam 9	Lock and Dam 10
1960	11,997	8,214
1961	10,777	7,693
1962	9,648	8,266
1963	12,208	7,271
1964	11,478	7,315
1965	Not Available	Not Available
1966	Not Available	Not Available
1967	12,4[illegible]	6,781
1968	13,846	6,811
1969	9,187	8,108
1970	10,327	5,750

NOTE: Counts are made once each day at 3:00 p.m.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 171

NUMBER OF SPORT FISHERMEN OBSERVED ANNUALLY BY BOTH ATTENDANTS FROM LOCK AND DAM SITES AT BOTH ENDS OF POOL 10

1960-1970

POOL 10 TOTAL VISITATION - 1963

Activity	Annual 1963		Peak Periods		
	Percent of Total	Activity Participation	Percent of Total	Activity Participation Month(July)	Peak Day
Camping	2.7	4,050	3.2	1,250	95
Picnicking	5.3	7,950	5.2	2,030	155
Boating	23.3	34,950	30.0	11,700	885
Fishing	58.5	87,750	54.8	21,370	1,615
Water Skiing	2.0	3,000	3.2	1,250	95
Swimming	2.2	3,300	3.6	1,400	105
SUBTOTAL	94.0	141,000	100.0	39,000	2,950
Hunting	6.0	9,000		5,850 (Oct)	440 (Oct)
TOTAL ANNUAL	100.0	150,000			

CORPS OF ENGINEERS

ST. PAUL DISTRICT

POOL 10 TOTAL VISITATION - 1963

EXHIBIT 172

EXISTING AND FUTURE ACREAGES OF DREDGED SPOIL

Pool	Estimated Acreages of Dredged Spoil		
	Existing[1]	Future[2]	Total
U&LSAF[3]	15	45	60
1	70	200	270
Minnesota River	20	60	80
2	155	265	420
St. Croix River	50	75	125
3	125	240	365
4	555	485	1040
5	305	350	655
5A	140	175	315
6	135	130	265
7	180	170	350
8	285	275	560
9	205	215	420
10	130	140	370
TOTAL	2,370	2,825	5,195

(1) Estimates based on areas taken from 1973 aerial photographs; approximate estimate of areas affected by dredged spoil from start of nine-foot channel project to 1973.

(2) Based on estimated requirements for next 50 years with continuation of present practices based on the average annual dredged volumes of the period 1956-1972, and a maximum height of dredged spoil area of thirty feet

(3) Upper and Lower St. Anthony Falls.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 173 EXISTING AND FUTURE ACREAGES OF DREDGED SPOIL

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL
UPPER AND LOWER ST. ANTHONY FALLS POOLS AND POOL 1

Location	Habitats Before Disposal	Present Habitats
8 acres E of channel at RM 848.1	8 acres channel border.	3 acres lowland woods and brush, 5 acres open sand-shoal.
2 acres E of channel at RM 848.8	2 acres channel border.	1 acre lowland woods and brush, 1 acre open sand-shoal.
14 acres W of channel between RM 849.1 and RM 849.9	14 acres channel border.	2 acres lowland woods and brush, 12 acres open sand-shoal.
7 acres, both sides of channel at RM 850.3	2 acres lowland woods and brush, 5 acres channel border.	7 acres open sand-shoal.
25 acres E of channel at RM 851.1	2 acres lowland woods and brush, 23 acres channel border.	5 acres lowland woods and brush, 20 acres open sand-shoal.
7 acres E of channel at RM 852.0	7 acres channel border.	5 acres lowland woods and brush, 2 acres open sand-shoal.
7 acres, both sides channel, RM 853.1	7 acres channel border.	2 acres lowland woods and brush, 5 acres open sand-shoal.
Subtotal, Pool 1, 70 acres	66 acres channel border, 4 acres lowland woods and brush.	18 acres lowland woods and brush, 52 acres open sand-shoal.
7 acres W of channel at RM (between Plymouth and Broadway Avenue Bridges)	7 acres channel border.	7 acres open sand-shoal.
1 acre E of channel at RM 857 (just below Lowry Avenue Bridge)	1 acre channel border.	1 acre open sand-shoal.
7 acres W of channel at RM (just above Lowry Avenue Bridge)	7 acres channel border.	7 acres open sand-shoal.
Subtotal, Upper and Lower St. Anthony Falls, 15 acres	15 acres channel border.	15 acres sand-shoal.
Total, 85 acres	81 acres channel border, 4 acres lowland woods and brush.	18 acres lowland woods and brush, 67 acres sand-shoal.

CORPS OF ENGINEERS
ST. PAUL DISTRICT

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, UPPER AND LOWER ST. ANTHONY FALLS POOLS AND POOL 1

EXHIBIT 174

ESTIMATED ACREAGES OF HABITATS AT KNOWN DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL
ST. CROIX RIVER AND MINNESOTA RIVER

Location	Habitats Before Disposal	Present Habitats
23 acres E of channel at RM 6.1 (at mouth of Kinnic-kinnic River)	10 acres lowland woods, 2 acres shallow aquatic, 11 acres open sand	10 acres lowland woods and brush, 13 acres open sand-shoal
3 acres E of channel at RM 11.5 (catfish bar)	1 acre lowland woods and brush, 2 acres channel border	3 acres open sand-shoal
16 acres E of channel between RM 16.4 and RM 17.3	16 acres channel border	3 acres lowland woods and brush, 13 acres open sand-shoal
8 acres E of channel at RM 17.5	8 acres shallow aquatic	8 acres open sand-shoal
Subtotal, St. Croix Pool, 50 acres	11 acres lowland woods and brush, 11 acres open sand-shoal, 10 acres shallow aquatic, 18 acres channel border	13 acres lowland woods and brush, 37 acres open sand-shoal
8 acres, both sides of channel at RM 4.5	6 acres lowland woods and brush, 2 acres channel border	4 acres lowland woods and brush, 4 acres open sand-shoal
3 acres, Island at RM 6.3	3 acres lowland woods and brush	3 acres lowland woods and brush
6 acres S of channel at RM 12.0	5 acres channel border, 1 acre lowland woods and brush	3 acres open sand-shoal, 3 acres lowland woods and brush
3 acres W of channel at RM 13.0	3 acres channel border	3 acres lowland woods and brush
Subtotal, Minnesota River, 20	10 acres lowland woods and brush, 10 acres channel border	13 acres lowland woods and brusn, 7 acres open sand-shoal
Total, 70 acres	21 acres lowland woods and brush, 11 acres open sand-shoal, 10 acres shallow aquatic, 28 acres channel border	26 acres lowland woods and brush, 44 acres open sand-shoal

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 175 ESTIMATED ACREAGES OF HABITATS AT KNOWN DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL ST. CROIX RIVER AND MINNESOTA RIVER

ESTIMATED ACREAGES OF HABITATS AT KNOWN DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 2

Location	Habitats Before Disposal	Present Habitats
7 Acres W of channel at RM 819.1	7 acres channel border.	2 acres lowland woods and brush, 5 acres open sand-shoal.
3 acres E of channel at RM 820.5 (Boulanger Island)	3 acres channel border.	1 acre lowland woods and brush, 2 acres open sand-shoal.
13 acres, both sides of channel, at RM 823.0	7 acres channel border, 3 acres lowland woods and brush, 3 acres shallow aquatic.	5 acres lowland woods and brush, 8 acres open sand-shoal.
31 acres in 3 areas, both sides of channel, at RM 823.7	10 acres channel border, 19 acres shallow aquatic, 2 acres lowland woods and brush.	6 acres lowland woods and brush, 25 acres open sand-shoal.
7 acres E of channel at RM 826.3	5 acres channel border, 2 acres lowland woods and brush.	2 acres lowland woods and brush, 5 acres open sand-shoal.
7 acres W of channel at RM 827.8	2 acres lowland woods and brush, 5 acres channel border.	2 acres open sand-shoal, 5 acres lowland woods and brush.
5 acres, mostly E of channel at RM 828.1	3 acres channel border, 2 acres lowland woods and brush.	4 acres lowland woods and brush, 1 acre open sand-shoal.
3 acres, both sides of channel, at RM 830.0	3 acres channel border.	2 acres lowland woods and brush, 1 acre open sand-shoal.
4 acres, both sides of channel, at RM 831.6	4 acres channel border.	1 acre open sand-shoal, 3 acres lowland woods and brush.
35 acres W of channel at RM 836.7	3 acres channel border, 32 acres shallow aquatic.	35 acres open sand-shoal.
3 acres in 2 areas at RM 831.9 and RM 837.3	3 acres channel border.	3 acres open sand-shoal.
12 acres W of channel at RM 838.9	8 acres channel border, 4 acres lowland woods and brush.	4 acres lowland woods and brush, 8 acres* open sand-shoal.
2 acres W of channel at RM 840.5	2 acres lowland woods and brush.	2 acres* open sand-shoal.
4 acres E of channel at RM 841.0	4 acres channel border.	1 acre lowland woods and brush, 3 acres open sand-shoal.
5 acres E of channel at RM 843.5	5 acres main channel border.	1 acre lowland woods and brush, 4 acres open sand-shoal.
6 acres W of channel at RM 845.0	6 acres lowland woods and brush.	6 acres lowland woods and brush.
8 acres at W of channel at RM 847.4	8 acres channel border.	2 acres lowland woods and brush, 6 acres open sand-shoal.
Total, Pool 2, 155 acres.	78 acres channel border, 23 acres lowland woods and brush, 54 acres shallow aquatic.	44 acres lowland woods and brush, 111 acres sand-shoal.

*Urban

CORPS OF ENGINEERS

ST. PAUL DISTRICT

ESTIMATED ACREAGES OF HABITATS AT KNOWN DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 2

EXHIBIT 176

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 3

Location	Habitats Before Disposal	Present Habitats
10 acres W of channel at RM 799.1 (nonfederal)	10 acres channel border.	4 acres lowland woods and brush, 6 acres open sand-shoal.
10 acres W of channel at RM 799.5	10 acres channel border.	7 acres lowland woods and brush, 3 acres open sand-shoal.
11 acres E of channel between RM 799.8 and RM 800.7	11 acres channel border.	5 acres lowland woods and brush, 6 acres open sand-shoal.
18 acres E of channel between RM 801.6 and RM 802.0	8 acres channel border, 1 acre shallow aquatic, 9 acres lowland woods and brush.	9 acres lowland woods and brush, 9 acres shallow aquatic.
11 acres W of channel between RM 802.0 and RM 802.5	11 acres channel border.	7 acres open sand-shoal, 4 acres lowland woods and brush.
7 acres E of channel at RM 802.7	7 acres channel border.	3 acres lowland woods and brush, 4 acres open sand-shoal.
6 acres W of channel between RM 802.8 and RM 803.3	6 acres channel border.	2 acres open sand-shoal, 4 acres lowland woods and brush.
2 acres, both sides of channel, at RM 804.4	2 acres channel border.	1 acre open sand-shoal, 1 acre lowland woods and brush.
5 acres, both sides of channel, at RM 804.9	5 acres channel border.	2 acres open sand-shoal, 3 acres lowland woods and brush.
2 acres W of channel at RM 805.9	2 acres channel border.	1 acre lowland woods and brush, 1 acre sand-shoal.
10 acres W of channel at RM 807.5	3 acres sand-shoal, 7 acres channel border.	5 acres open sand-shoal, 5 acres lowland woods and brush.
2 acres W of channel at RM 808.1	2 acres lowland woods and brush.	2 acres lowland woods and brush.
4 acres E of channel at RM 809.0	4 acres channel border.	2 acres lowland woods and brush, 2 acres open sand-shoal.
10 acres E of channel at RM 808.7	10 acres channel border.	6 acres lowland woods and brush, 4 acres open sand-shoal.
9 acres E of channel at RM 810.0	9 acres channel border.	2 acres lowland woods and brush, 7 acres open sand-shoal.
8 acres W of channel between RM 811.0 and RM 811.7	5 acres shallow aquatic, 3 acres lowland woods and brush.	2 acres shallow aquatic, 6 acres lowland woods and brush.
Total, Pool 3, 125 acres.	102 acres channel border, 6 acres shallow aquatic, 14 acres lowland woods and brush, 3 acres sand-shoal.	64 acres lowland woods and brush, 50 acres open sand-shoal, 11 acres shallow aquatic.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 177 ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 3

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 4

Location	Habitats Before Disposal	Present Habitats
23 acres, 3 sites east of channel, at RM 754.0	10 acres shallow aquatic, 13 acres channel border.	7 acres lowland woods and brush, 16 acres open sand-shoal.
35 acres, both sides of channel, at RM 756.2	5 acres lowland woods and brush, 13 acres sand-shoal, 9 acres channel border, 8 acres shallow aquatic.	10 acres lowland woods and brush, 25 acres open sand-shoal.
10 acres W of channel at RM 756.9 (just below Teepeeota Point)	2 acres channel border, 1 acre sand-shoal, 7 acres shallow aquatic.	3 acres lowland woods and brush, 7 acres open sand-shoal.
58 acres E of channel, across from Teepeota Point, between RM 756.8 and RM 758.1	40 acres sand-shoal, 8 acres channel border, 10 acres shallow aquatic.	20 acres lowland woods and brush, 38 acres open sand-shoal.
30 acres W of channel at RM 758.0	10 acres shallow aquatic, 5 acres channel border, 15 acres sand-shoal.	6 acres lowland woods and brush, 24 acres open sand-shoal.
20 acres E of channel between RM 758.5 and RM 759.2 (Hershey Island)	10 acres sand-shoal, 5 acres channel border, 5 acres lowland woods and brush.	12 acres lowland woods and brush, 8 acres open sand-shoal.
8 acres W of channel at RM 759.4 (Wabasha Boat Harbour)	8 acres lowland woods and brush.	8 acres open sand-shoal.
35 acres E of channel at RM 739.5	10 acres sand-shoal, 25 acres channel border.	3 acres lowland woods and brush, 32 acres open sand-shoal.
23 acres, both sides of channel, between RM 761.0 and RM 762.5 (Vicinity of Drury Island)	10 acres channel border, 5 acres sand-shoal, 8 acres lowland woods and brush.	10 acres lowland woods and brush, 13 acres open sand-shoal.
83 acres E of channel between RM 762.7 and RM 763.7 (Mouth of Chippewa River)	20 acres sand-shoal, 20 acres channel border, 43 acres shallow aquatic.	40 acres lowland woods and brush, 43 acres open sand-shoal.
23 acres both sides of channel at RM 785.3	9 acres lowland woods and brush, 14 acres shallow aquatic.	14 acres open sand-shoal, 9 acres lowland woods and brush.
15 acres W of channel at RM 789.5 (Island at Red Wing)	15 acres lowland woods and brush.	10 acres lowland woods and brush, 5 acres open sand-shoal.
78 acres E of channel between RM 789.1 and 790.4	20 acres shallow aquatic, 58 acres lowland woods and brush.	35 acres open sand-shoal, 43 acres lowland woods and brush.
72 acres both sides of channel between RM 791.8 and RM 793.4	15 acres sand-shoal, 10 acres shallow aquatic, 47 acres lowland woods and brush.	10 acres open sand-shoal, 62 acres lowland woods and brush.
12 acres W of channel at RM 794.0	2 acres shallow aquatic. 10 acres lowland brush and woods.	12 acres lowland woods and brush.
30 acres, both sides of channel, between RM 794.7 and RM 796.3	5 acres sand-shoal, 5 acres channel border, 20 acres lowland woods and brush.	15 acres lowland woods and brush, 15 acres open sand-shoal.
Total, Pool 4, 555 acres.	134 acres shallow aquatic, 102 acres channel border, 185 acres lowland woods and brush, 134 acres sand-shoal.	262 acres lowland woods and brush, 293 acres open sand-shoal.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 4

EXHIBIT 178

ESTIMATED ACREAGES OF HABITATS AT KNOWN DISPOSAL SITES BEFORE AND AFTER
AFTER PLACEMENT OF SPOIL, POOL 5

Location	Habitats Before Spoil Disposal	Present Habitats
5 acres W of channel at RM 741.5	5 acres shallow aquatic.	5 acres open sand-shoal.
30 acres E of channel between RM 742.6 and RM 743.8	4 acres sand-shoal, 26 acres channel border.	20 acres lowland woods and brush, 10 acres open sand-shoal.
20 acres W of channel between RM 743.0 and RM 743.7	12 acres sand-shoal, 8 acres channel border.	10 acres lowland woods and brush, 10 acres open sand-shoal.
35 acres W of channel between RM 743.9 and RM 744.6	19 acres sand-shoal, 16 acres channel border.	15 acres lowland woods and brush, 20 acres open sand-shoal.
35 acres W of channel between RM 743.8 and RM 744.7	2 acres sand-shoal, 33 acres channel border.	10 acres lowland woods and brush, 25 acres open sand-shoal.
45 acres, mostly E of channel between RM 744.8 and RM 745.6	13 acres shallow aquatic, 12 acres sand-shoal, 20 acres channel border.	10 acres lowland woods and brush, 35 acres open sand-shoal.
23 acres E of channel between RM 745.7 and RM 746.4	4 acres lowland woods and brush, 19 acres channel border.	7 acres lowland woods and brush, 16 acres open sand-shoal.
40 acres W of channel between RM 745.7 and RM 746.7	30 acres of sand-shoal, 10 acres channel border.	20 acres lowland woods and brush, 20 acres open sand-shoal.
14 acres E of channel between RM 746.7 and RM 748.0	9 acres sand-shoal, 5 acres channel border.	9 acres open sand-shoal, 5 acres lowland woods and brush.
43 acres, mostly W of channel between RM 747.8 and RM 748.8	20 acres sand-shoal, 10 acres shallow aquatic, 13 acres channel b order.	20 acres lowland woods and brush, 23 acres open sand-shoal.
6 acres E of channel between RM 749.6 and RM 750.2	1 acre channel border, 5 acres sand-shoal.	3 acres lowland woods and brush, 3 acres open sand-shoal.
9 acres W of channel between RM 752.1 and RM 752.7	4 acres open sand-shoal, 5 acres channel border.	6 acres lowland woods and brush, 3 acres open sand-shoal.
Total, Pool 5, 305 acres.	28 acres shallow aquatic, 117 acres sand-shoal, 156 acres channel border, 4 acres lowland woods and brush.	179 acres sand-shoal, 126 acres lowland woods and brush.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 179 ESTIMATED ACREAGES OF HABITATS AT KNOWN DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 5

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 5A

Location	Habitats Before Disposal	Present Habitats
18 acres W of channel between RM 728.8 and RM 729.2 (Islands 65 and 67)	5 acres channel border, 8 acres shallow aquatic, 5 acres lowland woods and brush.	8 acres lowland woods and brush, 10 acres open sand-shoal.
28 acres E of channel (off Betsy Slough) between RM 729.3 and RM 730.5	8 acres shallow aquatic, 10 acres sand-shoal, 10 acres channel border.	15 acres lowland woods and brush, 13 acres open sand-shoal.
22 acres W of channel (off Pap Slough) between RM 730.8 and RM 731.8	5 acres sand-shoal, 17 acres channel border.	8 acres lowland woods and brush, 14 acres open sand-shoal.
5 acres E of channel at RM 731.9 (lower end of Fountain City)	5 acres channel border.	2 acres lowland woods and brush, 3 acres open sand-shoal.
5 acres W of channel at RM 732.3 (across from Fountain City)	5 acres channel border.	3 acres lowland woods and brush, 2 acres open sand-shoal.
16 acres W of channel between RM 733.6 and RM 734.2 (Islands 58 and 59)	6 acres lowland woods and brush, 5 acres sand-shoal, 5 acres channel border.	5 acres lowland woods and brush, 11 acres open sand-shoal.
16 acres W of channel at RM 734.7 (Island 57)	5 acres lowland woods and brush, 11 acres channel border.	12 acres lowland woods and brush, 4 acres open sand-shoal.
25 acres E of channel between RM 734.1 and RM 734.9	12 acres open sand-shoal, 13 acres channel border.	10 acres lowland woods and brush, 15 acres open sand-shoal.
3 acres W of channel at RM 735.4	3 acres channel border.	1 acre lowland woods and brush, 2 acres open sand-shoal.
2 acres W of channel at RM 736.0	1 acre sand-shoal, 1 acre channel border.	1 acre lowland woods and brush, 1 acre open sand-shoal.
Total, Pool 5A, 140 Acres	75 acres channel border, 16 acres shallow aquatic, 16 acres lowland woods and brush, 33 acres sand-shoal.	65 acres lowland woods and brush, 75 acres sand-shoal.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 5A

EXHIBIT 180

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 6

Location	Habitats Before Disposal	Present Habitats
3 acres W of channel at RM 718.8	3 acres channel border	3 acres sand-shoal.
16 acres, both sides of channel, at RM 720.6	5 acres shallow aquatic, 5 acres sand-shoal, 6 acres channel border.	2 acres lowland woods and brush, 14 acres open sand-shoal.
12 acres: W of channel at RM 720.9 and E of channel at RM 721.2	8 acres channel border, 4 acres lowland woods and brush.	8 acres open sand and shoal, 4 acres lowland woods and brush
3 acres E of channel at RM 721.9	2 acres channel border, 1 acre lowland woods and brush.	1 acre lowland woods and brush, 2 acres open sand-shoal.
27 acres E of channel on 4 islands between RM 722.4 and RM 723.8	18 acres sand-shoal, 9 acres channel border.	14 acres open sand-shoal, 13 acres lowland woods and brush.
9 acres W of channel (S end of city of Winona) at RM 723.5	5 acres shallow aquatic, 1 acre lowland woods and brush, 3 acres channel border.	6 acres open sand-shoal, 3 acres lowland woods and brush.
2 acres W of channel at RM 723.8 and RM 723.9 (just above and just below railroad bridge).	1 acre shallow aquatic, 1 acre channel border.	1 acre lowland woods and brush, 1 acre open sand-shoal.
10 acres E of channel on island at RM 724.2	1 acre sand-shoal, 9 acres channel border.	4 acres lowland woods and brush, 6 acres open sand-shoal.
10 acres E of channel at RM 726.0 (on Tatsch Island, just above railroad bridge).	5 acres sand-shoal, 5 acres shallow aquatic	6 acres lowland woods and brush, 4 acres open sand-shoal.
15 acres W of channel at RM 726.2	2 acres channel border, 5 acres shallow aquatic, 8 acres lowland woods and brush.	5 acres open sand-shoal, 10 acres lowland woods and brush.
10 acres W of channel at RM 726.7	3 acres sand-shoal, 7 acres channel border.	6 acres lowland woods and brush, 4 acres open sand-shoal.
3 acres E of channel at RM 727.0	1 acre sand-shoal, 2 acres channel border.	1 acre lowland woods and brush, 2 acres open sand-shoal.
15 acres, both sides of channel, at RM 728.4	6 acres channel border, 9 acres lowland woods and brush.	6 acres lowland woods and brush, 9 acres sand-shoal.
Total, Pool 6, 135 acres.	58 acres channel border, 21 acres shallow aquatic, 33 acres sand-shoal, 23 acres lowland woods and brush.	78 acres sand-shoal, 57 acres lowland woods and brush.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 181

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 6

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES, BEFORE AND AFTER PLACEMENT OF SPOIL
POOL 7

Location	Habitats Before Disposal	Present Habitats
3 acres; E of channel at RM 703.5; tail of Presback Island	3 acres shallow aquatic	1 acre lowland woods and 2 acres open sand-shoals
20 acres; E of channel at RM 704.5; head of Presback Island	5 acres lowland woods and 15 acres shallow aquatic	10 acres open sand-shoals and 10 acres lowland woods
10 acres; W of channel at RM 705; along Presback	10 acres lowland woods	7 acres lowland woods and 3 acres open sand-shoals
3 acres; E of channel at RM 706.5; across from Dakota	1 acre sand-shoal and 2 acres channel border	2 acres lowland woods and 1 acre open sand-shoal
1 acre; E of channel at RM 706.7; across from Dakota	1 acre sand-shoal	1 acre open sand-shoal
15 acres; W of channel at RM 706.5; at Dakota (Dakota Island)	5 acres lowland woods and 10 acres shallow-aquatic	4 acres lowland woods and 11 acres open sand-shoal
10 acres; E of channel at RM 708.5; (Winter's Landing)	10 acres channel border	1 acre lowland woods and 9 acres open sand-shoal
25 acres; E of channel at RM 709.0; (Winter's Landing)	8 acres lowland woods and 17 acres channel border	18 acres lowland woods and 7 acres open sand-shoal
10 acres; W of channel at RM 708.5; across from Winter's Landing	8 acres channel border and 2 acres lowland woods	10 acres open sand-shoal
6 acres; E of channel at RM 710.5	3 acres sand-shoal and 3 acres lowland woods	3 acres open sand-shoal and 3 acres lowland woods
30 acres; W of channel at RM 712.0; (Richmond Island)	15 acres lowland woods, 10 acres shallow aquatic and 5 acres sand-shoal	15 acres lowland woods and 15 acres open sand-shoal
20 acres; E of channel at RM 712.0; across from Richmond Island	3 acres lowland woods, 7 acres sand-shoal and 10 acres channel border	10 acres lowland woods and 10 acres open sand-shoal
15 acres; E of channel at RM 713.0; across from Richmond Island	3 acres channel border and 12 acres sand-shoal	7 acres lowland woods and 8 acres open sand-shoal
5 acres; W of channel at RM 713.2	3 acres channel border and 2 acres sand-shoal	3 acres open sand-shoal and 2 acres lowland woods
1 acre; W of channel at RM 713.4	1 acre lowland woods	1 acre open sand-shoal
6 acres; W of channel at RM 714.0	4 acres sand-shoal and 2 acres channel border	3 acres lowland woods and 3 acres open sand-shoal
180 acres total pool	36 acres shallow aquatic; 52 acres lowland woods; 37 acres sand-shoal and 55 channel border	83 acres lowland woods and 97 acres open sand-shoal

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ST. PAUL DISTRICT

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 7 EXHIBIT 182

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES, BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 8

Location	Habitats before Disposal	Present Habitats
6 acres: E of channel at RM 683.5; and W of channel at RM 684.0	6 acres shallow aquatic	6 acres open sand-shoals.
3 acres E of channel at RM 685.0	3 acres sand-shoal.	3 acres open sand-shoals.
17 acres E of channel at RM 686.7 (Turtle Island)	5 acres channel border, 5 acres shallow aquatic, 7 acres sand-shoal.	10 acres lowland woods and brush, 7 acres open sand-shoal.
12 acres W of channel at RM 687.2	2 acres channel border, 10 acres shallow aquatic.	4 acres woodland, 8 acres open sand-shoal.
28 acres W of channel between RM 687.7 and RM 688.4	14 acres shallow aquatic, 14 acres channel border.	5 acres lowland woods and brush, 23 acres open sand-shoal.
40 acres E of channel at RM 688.4	40 acres channel border.	20 acres sand-shoal, 20 acres lowland woods and brush.
28 acres W of channel at Brownsville, RM 689.6	10 acres sand-shoal, 15 acres shallow aquatic, 3 acres channel border.	10 acres lowland woods and brush, 5 acres marsh, 13 acres open sand and shoals.
27 acres E of channel, across from Brownsville, between RM 688.6 and 689.3	10 acres channel border, 10 acres shallow aquatic, 7 acres lowland woods and brush.	15 acres lowland woods and brush, 12 acres open sand-shoal.
30 acres E of channel, between RM 690.1 and RM 690.5	15 acres sand-shoal, 15 acres channel border.	15 acres lowland woods and brush, 15 acres open sand-shoal.
25 acres W of channel between RM 690.5 and RM 691.0	5 acres sand-shoal, 5 acres lowland woods and brush, 15 acres channel border.	12 acres lowland woods and brush, 13 acres sand-shoal.
13 acres E of channel on 3 sites at RM 691.6, RM 691.8, and RM 692.5	10 acres sand shoal, 3 acres channel border.	9 acres lowland woods and brush, 4 acres sand-shoal.
10 acres E of channel at RM 691.6	5 acres channel border, 5 acres lowland woods and brush.	1 acre shallow aquatic, 1 acre open sand-shoal, 8 acres lowland woods and brush.
6 acres E of channel at RM 693.0	5 acres sand-shoal, 1 acre shallow aquatic	2 acres lowland woods and brush, 4 acres open sand-shoal.
15* acres W of channel at RM 694.5	15 acres sand-shoal.	10 acres lowland woods and brush, 5 acres open sand-shoal.
7 acres E of channel between RM 694.6 and RM 695.0	3 acres open sand-shoal, 4 acres channel border.	4 acres lowland woods and brush, 3 acres open sand and shoal.
18 acres between RM 700.0 and RM 700.5 as follows: 4 acres W of channel at RM 700.0; 10 acres E of channel at RM 700.0; 4 acres W of channel at RM 700.5	14 acres channel border, 4 acres lowland woods and brush.	9 acres open sand-shoal, 9 acres lowland woods and brush.
285 acres total pool.	61 acres shallow aquatic, 73 acres sand-shoal, 130 acres channel border, 21 acres lowland woods and brush.	6 acres shallow aquatic, 146 acres open sand-shoal, 133 acres lowland woods and brush.

*Non-Federal Land.

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ST. PAUL DISTRICT

EXHIBIT 183

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES, BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 8

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES,
BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 9

Location	Habitats Before Disposal	Present Habitats
4 acres W of channel at RM 654.0	4 acres channel border	4 acres sand-shoal
4 acres W of channel at RM 660.2	1 acre sand-shoal, 3 acres channel border	4 acres sand-shoal
30 acres W of channel at RM 664.2	15 acres lowland woods and brush, 5 acres channel border, 10 acres shallow aquatic	15 acres lowland woods and brush, 15 acres open sand and shoal
19 acres E of channel between RM 664.5 and RM 664.8	10 acres channel border, 5 acres shallow aquatic, 4 acres lowland woods and brush	12 acres lowland woods and brush, 7 acres open sand and shoal
9 acres W of channel at RM 665.0	9 acres main channel border.	5 acres lowland woods and brush, 4 acres open sand-shoal.
18 acres W of channel at RM 665.5	3 acres sand-shoal, 15 acres channel border.	9 acres open sand-shoal, 9 acres lowland woods and brush.
12 acres W of channel at RM 667.8	6 acres channel border, 6 acres lowland woods and brush.	8 acres lowland woods and brush, 4 acres open sand and shoal.
3 acres E of channel at RM 669.1	3 acres channel border.	1 acre lowland woods and brush, 2 acres open sand-shoal.
6 acres E of channel at RM 671.2	1 acre channel border, 5 acres lowland woods and brush.	3 acres lowland woods and brush, 3 acre open sand (developed).
25 acres W of channel between RM 671.0 and RM 671.6	5 acres channel border, 5 acres sand-shoal, 15 acre lowland woods and brush.	15 acres lowland woods and brush, 10 acres open sand-shoal.
5 acres E of channel at RM 671.7	5 acres lowland woods and Brush.	2 acres lowland woods and brush, 3 acres open sand-shoal.
5 acres W of channel at RM 672.0	1 acre channel border, 2 acres shallow aquatic, 2 acres lowland woods and brush.	5 acres lowland woods and brush.
30 acres W of channel between RM 676.0 and RM 676.5	5 acres channel border, 3 acres shallow aquatic, 22 acres lowland woods and brush.	20 acres lowland woods and brush, 10 acres open sand-shoal.
5 acres E of channel in 2 sites at RM 676.6 and 677.3	2 acres sand-shoal, 3 acres channel border.	5 acres open sand-shoal.
12 acres E of channel between RM 677.5 and 677.9	2 acres shallow aquatic, 3 acres channel border, 7 acres lowland woods and brush.	10 acres lowland woods and brush, 2 acres open sand and shoal.
18 acres W of channel between RM 678.0 and RM 678.8	5 acres sand-shoal, 13 acres channel border.	10 acres lowland woods and brush, 8 acres open sand-shoal.
205 acres total pool	86 acres channel border, 16 acres sand-shoal, 81 acres lowland woods and brush, 22 acres shallow aquatic.	90 acres open sand-shoal, 115 acres lowland woods and brush.

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ST. PAUL DISTRICT

ESTIMATED ACREAGES OF HABITATS AT KNOWN SPOIL DISPOSAL SITES, BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 9 EXHIBIT 184

ESTIMATED ACREAGES OF HABITATS AT SPOIL DISPOSAL SITES, BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 10

Location	Habitats Before Disposal	Present Habitats
2 acres on E side of channel at RM 618.4	1 acre channel border, 1 acre sand-shoal.	2 acres lowland woods and brush.
8 acres on head of McMillan Is. at RM 618.6	4 acres lowland woods and brush, 2 acres shallow aquatic, 2 acres channel border.	3 acres lowland woods and brush, 5 acres open sand and shoal.
4 acres just above McMillan Is. at RM 618.8	1 acre channel border, 1 acre shallow aquatic, 2 acres lowland woods and brush.	3 acres lowland woods and brush, 1 acre sand-shoal.
2 acres E of main channel at RM 618.9	1 acre channel border, 1 acre shallow aquatic.	1 acre lowland woods and brush, 1 acre sand-shoal.
5 acres on islands W of channel at RM 619.2-619.5	2 acres channel border, 2 acres shallow aquatic, 1 acre lowland woods and brush.	3 acres lowland woods and brush, 2 acres sand-shoal.
10 acres E of channel between RM 627.2-627.6	2 acres lowland woods and brush, 5 acres channel border, 3 acres sand-shoal.	1 acre shallow aquatic, 4 acres sand-shoal, 5 acres lowland woods and brush.
10 acres W of channel between RM 227.5 and RM 628.2, just above entrance to Wyalusing Slough.	2 acres sand-shoal, 8 acres channel border.	5 acres lowland woods and brush, 5 acres sand-shoal.
16 acres E of channel between RM 627.5 and RM 628.0	10 acres channel border, 2 acres sand-shoal, 4 acres lowland woods and brush.	10 acres sand-shoal, 6 acres lowland woods and shrub.
4 acres E of channel at RM 633.6	2 acres channel border, 2 acres lowland woods and brush.	4 acres lowland woods and brush.
8 acres E of channel at RM 643.0	2 acres shallow aquatic, 6 acres lowland woods and brush.	8 acres sand-shoal (of which 2 acres is developed).
5 acres W of channel at RM 643.0	5 acres channel border.	3 acres lowland woods and brush, 2 acres sand-shoal.
2 acres E of channel at RM 643.5	2 acres channel border.	2 acres sand-shoal.
2 acres E of channel at RM 644.0	2 acres channel border.	1 acre lowland woods and brush, 1 acre sand-shoal.
2 acres E of channel at RM 644.5	1 acre sand-shoal, 1 acre channel border.	1 acre sand-shoal, 1 acre lowland woods and brush.
28 acres in 4 sites W of channel between RM 644.1 and RM 644.9	4 acres channel border, 10 acres shallow aquatic, 14 acres lowland woods and brush.	8 acres sand-shoal, 20 acres lowland woods and brush.
22 acres E of channel between RM 645.9 and RM 646.8	22 acres channel border.	7 acres lowland woods and brush, 15 acres sand-shoal.
130 acres total pool.	68 acres channel border, 9 acres sand-shoal, 35 acres lowland woods, 18 acres shallow aquatic.	65 acres sand-shoal (of which 2 acres are developed), 64 acres lowland woods and brush, 1 acre shallow aquatic.

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ST. PAUL DISTRICT

EXHIBIT 185

ESTIMATED ACREAGES OF HABITATS AT SPOIL DISPOSAL SITES, BEFORE AND AFTER PLACEMENT OF SPOIL, POOL 10

INDIVIDUAL POOL SUMMARIES OF ESTIMATED HABITAT CHANGES AT SPOIL SITES

Pool	Total Known Acres Affected	Habitats Before Disposal: Lowland Woods	Habitats Before Disposal: Sand-Shoal	Habitats Before Disposal: Shallow Aquatic	Habitats Before Disposal: Channel Border	Habitats After Disposal: Lowland Woods	Habitats After Disposal: Open Sand-Shoal	Habitats After Disposal: Shallow Aquatic	Habitats After Disposal: Channel Border
Upper and Lower St. Anthony Falls	15	-	-	-	15	-	15	-	-
1	70	4	66	-	-	18	52	-	-
Minnesota River	20	10	-	-	10	13	7	-	-
2	155	23	-	54	78	44	111	-	-
St. Croix River	50	11	11	10	18	13	37	-	-
3	125	14	3	6	102	64	50	11	-
4	555	185	134	134	102	262	293	-	-
5	305	4	117	28	156	126	179	-	-
5A	140	16	33	16	75	65	75	-	-
6	135	23	33	21	58	57	78	-	-
7	180	52	37	36	55	83	97	-	-
8	285	21	73	61	130	133	146	6	-
9	205	81	16	22	86	115	90	-	-
10	130	35	9	18	68	64	65	1	-
TOTAL	2370	479	532	406	953	1057	1295	18	-

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ST. PAUL DISTRICT

INDIVIDUAL POOL SUMMARIES OF ESTIMATED HABITAT CHANGES AT SPOIL SITES

EXHIBIT 186

AVERAGE VALUES AND RESULTS OF STATISTICAL TESTS OF SIGNIFICANCE FOR WATER QUALITY DATA BEFORE, DURING, AND AFTER DREDGING; POOL 8, SUMMER, 1973 (1)

Water Quality Parameter	Averages of Data from 40 Sample Stations				Results of Statistical Test of Significance of Differences in Sample Averages	
	4 Days Prior to Dredging	During Dredging		1 Week After Completion of Dredging	F-Valve	Significance
Temperature (degrees Centigrade)	24.437 (3)	23.312	21.275	23.375	221.102	99%
Depth (meters)	1.494	1.469	1.784	1.682	0.620	None
Turbidity (Jackson Units)	30.475	55.000	54.150	65.025 (2)	25.412	99%
Conductivity (micromhos/cm)	30.675	31.875	35.625	39.600	1.133	None
Nitrate Nitrogen (milligrams/liter)	0.802	1.131	1.222	1.039	35.450	99%
Nitrite Nitrogen (milligrams/liter)	0.025	0.035	1.031	0.036	40.235	99%
Phosphate (milligrams/liter)	0.312	0.257	0.293	0.282	0.848	None
Dissolved Oxygen (milligrams/liter)	10.489	7.672	8.022	8.154	99.816	99%

(1) Adapted from table A-11-a, pool 8, Environmental Assessment Report.
(2) Value showing turbidity higher than during dredging is probably in error.
(3) The data is accurate to two significant figures.

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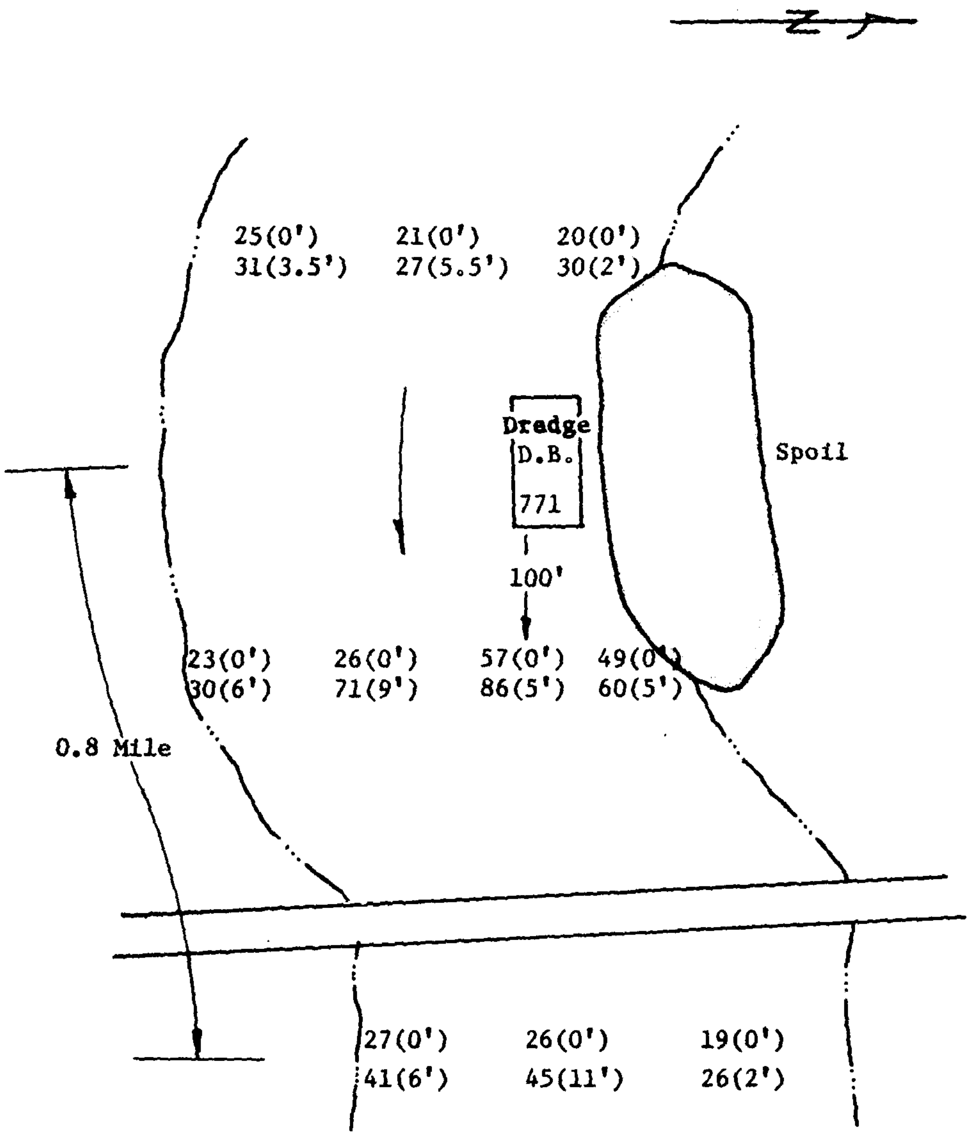
EXHIBIT 187 AVERAGE VALUES AND RESULTS OF STATISTICAL TESTS OF SIGNIFICANCE FOR WATER QUALITY DATA BEFORE, DURING, AND AFTER DREDGING; POOL 8, SUMMER, 1973

EFFECT OF CLAMSHELL DREDGING UPON TURBIDITY



Effect of Clamshell Dredging Upon Turbidity
in the Minnesota River, September 25, 1973
Depth in feet in Parenthesis, and Turbidity
Indicated in Jackson Unit. (JTU)

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ST. PAUL DISTRICT

EFFECT OF CLAMSHELL DREDGING UPON TURBIDITY

EXHIBIT 188

RELATIVE COMPARISON OF REQUIREMENTS FOR CONFINED AND UNCONFINED DISPOSAL CONDITIONS

	Volume Dredged (Cu.Yds)	Maximum Height of Disposal Area[1] (Feet)	Disposal Area Required (Acres)	Estimated Cost of Confinement Facility: First Cost	Estimated Cost of Confinement Facility: Cost per Cu. Yard
Small Volume					
Confined Disposal[2]	100,000[3]	10	15	$ 35,000	$0.35
Unconfined Disposal	100,000	10	10	-	-
Large Volume					
Confined Disposal[4]	1,000,000	31	30	$150,000	$0.15
Unconfined Disposal	1,000,000	30	35	-	-

(1) The maximum height for confined disposal is based on total height at embankment section; actual final height of area after complete utilization would be about three feet less due to no further need for freeboard or ponding area retention time.
(2) Assumes only one level of dike; no dike raises.
(3) A minimum volume of about 100,000 cubic yards would be necessary for any confinement area to provide appropriate ponding time.
(4) Assumes four levels of dike construction, as necessary.

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EXHIBIT 189 RELATIVE COMPARISON OF REQUIREMENTS FOR CONFINED AND UNCONFINED DISPOSAL CONDITIONS

PARTIAL LIST OF PLANTS FOR ESTABLISHING VEGETATIVE COVER ON DREDGED SPOIL MATERIALS

Scientific Name(1)	Colloquial Name	Potential Growing Sites	Local Abundance
Agropyron dacystachyum	Thickspike wheat grass	Plains and sandy shores	Uncommon
Agrostis hyemalis	Tickle grass	Dry, open sandy areas	Uncommon
Agrostis scabra	Hair grass	Sandy soil	Common
Alopecurus arundinaceus	Garrison creeping foxtail	Dry soils	Uncommon
Ammophila breviligulata	American beach grass	Sand dunes	Uncommon
Andropogon gerardi	Big Bluestem	Dry soils, prairies	Common
Andropogon hallii	Sand bluestem	Sandy hills and soils	Rare
Andropogon scoparius	Little Bluestem	Dry, soils, prairies	Common
Aristida basiramea	Triple-awned grass	Dry, open sand	Common
Aristida tuberculosa	Three awn	Dry, open sand	Common
Bouteloua curtipendula	Tall grama grass	Sandy, upland prairies	Common
Bouteloua hirsuta	Grama	Sandy, upland prairies	Common
Calamovilfa longifolia	Prairie sand reed	Dry, sandy soil	Rare
Cenchrus longispinus	Sandbur	Dry sand, riverbanks	Common
Digitaria ischaemum	Crabgrass	Dry, sandy soil	Common
Elymus canadensis	Canadian wild rye	Open, sandy soil, riverbanks	Common
Elymus flavescens	Wild rye	Sand dunes	Uncommon
Elymus mollis	American dune grass	Sand dunes	Uncommon
Festuca ovina	Duarhard fescue	Dry, sandy plains(2)	Rare
Festuca rubra	Creeping red fescue	Dry, sandy plains(2)	Rare
Glyceria canadensis	Rattlesnake grass	Moist sandy meadows	Common
Koeleria cristata	Junegrass	Dry, sandy plains	Common
Leptoloma cognatum	Fall witch grass	Dry, sandy soils	Common
Oryzopsis hymenoides	Indian rice grass	Dry, open sand	Uncommon
Oryzopsis pungens	Rice grass	Dry, sandy woods	Uncommon
Panicum agrostoides	Monroe grass	Moist sand	Rare
Panicum capillare	Old witch grass	Dry, open sand	Common
Panicum virgatum	South Dakota No. 149	Dry, open sand(2)	Common
Panicum virgatum	Nebraska No. 28	Dry, open sand(2)	Common
Sporobolus cryptandrus	Sand drop seed	Dry, sandy, open areas	Common
Sporobolus heterolepis	Northern drop seed	Dry, sandy, open areas	Common
Herbaceous (Legumes)			
Amorpha canescens	Leadplant	Sandy, upland prairies	Common
Lathyrus venosus	Pea	Dry, sandy plains	Common
Lotus corniculatus	Birdsfoot-trefoil	Sandy soil	Uncommon
Lupinus perennis	Wild lupine	Dry, sandy prairies	Common
Petalostemon candidus	White prairie clover	Sandy, upland prairies	Common
Strophostyles helvola	Wild bean	Open sandy soil	Uncommon
Strophostyles leiosperma	Piper	Dry, sandy soil	Rare
Tephrosia virginiana	Goat's rue	Dry, sandy prairies	Common
Woody Plants			
Acer rubrum	Red maple	Low sandy woods	Common
Acer saccharinum	Silver maple	Alluvial woods and shores	Common
Betula nigra	River birch	River and lake margins	Common
Cornus obliqua	Silky dogwood	Low sandy woods	Common
Cornus stolonifera	Red osier	Sandy shores and low woods	Common
Populus deltoides	Cottonwood	Alluvial woods and shores	Common
Populus tremuloides	Trembling aspen	Dry to moist woods	Common
Salix humilis	Prairie willow	Dry prairies, low sandy woods	Common
Salix interior	Sandbar willow	Open alluvial woods	Common
Salix sericea	Silky willow	Moist sandy woods	Rare
Salix tristes	Sage willow	Sandy meadows	Rare

(1) Names-conditions-abundance derived from Hartley, T. G. 1966. The flora of "The Driftless Area". University of Iowa, 174 pp.
(2) Varieties of indicated species selected for their ability to thrive under indicated growing conditions.

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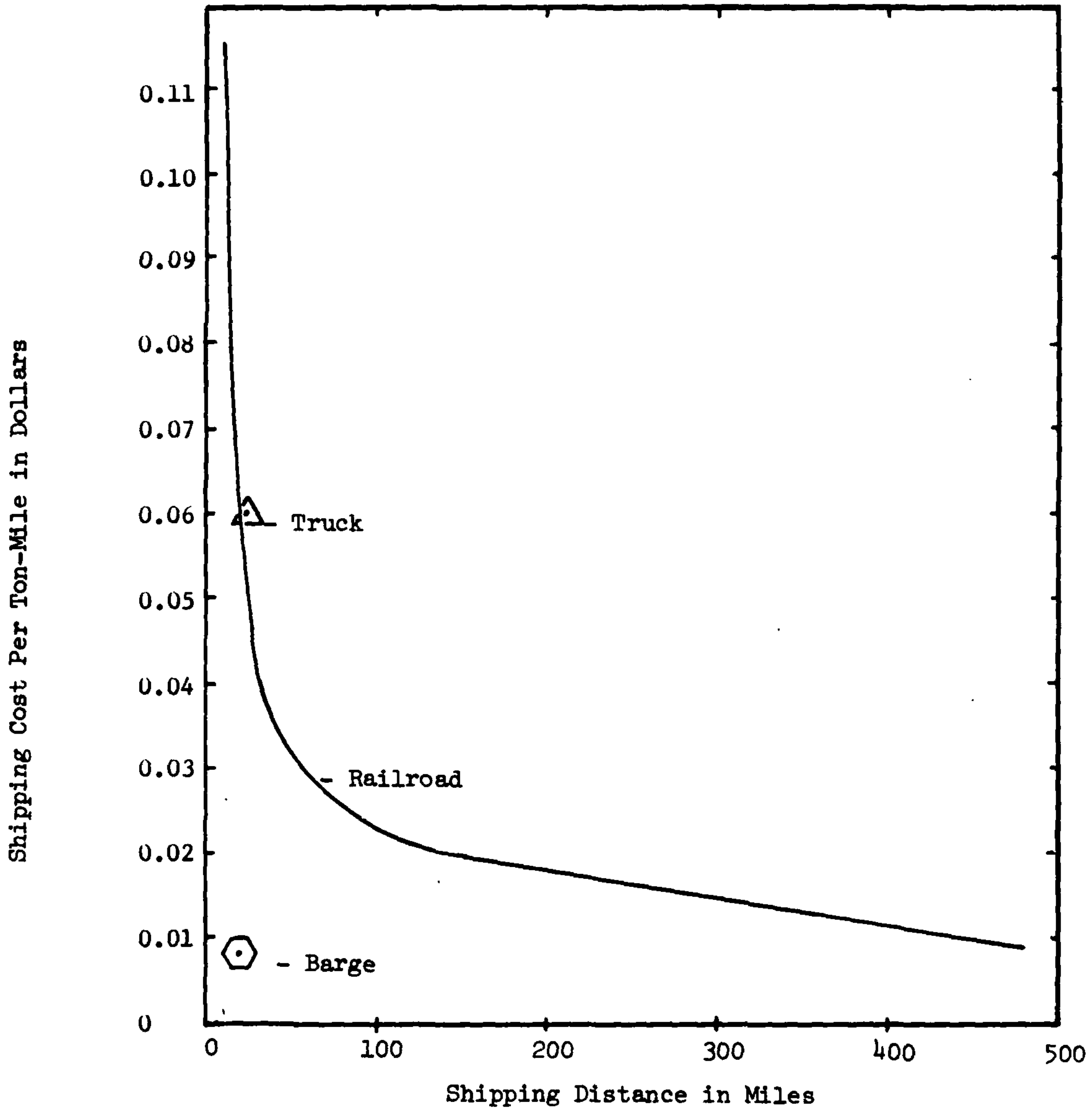
PARTIAL LIST OF PLANTS FOR ESTABLISHING VEGETATIVE COVER ON DREDGED SPOIL MATERIALS

EXHIBIT 190

SHIPPING RATES FOR DRY SAND AND GRAVEL



NOTE: Rates are based on material being shipped in a dry condition and are shown only for general purposes of comparison; actual rates at a given location may vary from those shown.
A rate curve is presented for railroad only; truck and barge rates are given for one point only.
Conversion factor: Rate per ton-mile x 1.35 = Rate per cubic yard-mile.

EXHIBIT 191 SHIPPING RATES FOR DRY SAND AND GRAVEL

BASIC AUXILIARY TRANSPORTATION EQUIPMENT NEEDED PER DAY TO REMOVE DREDGED MATERIAL FROM FLOODPLAIN STOCKPILE AREAS

	Individual Navigation Pool (1)		All Pools-St. Paul District (2)	
	Year-Round (3) Operation	Six Month (4) Operation	Year-Round (3) Operation	Six Month (4) Operation
Railroad Card (35 cubic yard capacity)	12	24	206	412
Truck (10 cubic yard capacity)	40	80	720	1440
Barge (1000 cubic yard capacity)	1/2	1	7	14

(1) Based on about 100,000 cubic yards of dredged material per year per pool.
(2) Based on about 1.8 million cubic yards of dredged material per year.
(3) Based on 250 working days.
(4) Based on 125 working days.

BASIC AUXILIARY TRANSPORTATION EQUIPMENT NEEDED TO REMOVE DREDGED MATERIAL FROM FLOODPLAIN STOCKPILE AREAS PER DAY

EXHIBIT 192

PERTINENT INFORMATION ON EQUIPMENT CAPABILITIES FOR OPENING
CHANNELS INTO BACKWATER AREAS

Equipment Type and Size	Minimum Channel Size Which Could be Dredged		Equipment Capacity per Day (cu. yds.)	Approximate Cost per Cubic Yard Removed (1)
	Width (ft)	Depth (ft)		
WILLIAM A. THOMPSON (20 in. diam. pipe) Hydraulic Dredge	100	5½	18,000	$ .30(2)
DERRICKBARGE HAUSER 767 - (4 cubic yd. clam)	100	5½	3,000	1.56
WADE CRANE BARGE 771 - (2 cubic yds. clam)	100	5½	1,500	3.00
DRAG LINE (2 cubic yd. perforated scoop)	100	5½	640	3.00
DEPOT BAY (8 in. diam. pipe) Hydraulic Dredge	30	3½	1,000	1.25

(1) These cost figures represent U.S. Government costs for major channel maintenance activities and do not represent private contractor rates or unit costs for dredging backwater channels.
(2) Weighted average cost per year, 1968-1972.

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EXHIBIT 193

PERTINENT INFORMATION ON EQUIPMENT CAPABILITIES
FOR OPENING CHANNELS INTO BACKWATER AREAS

EXPLANATION OF IMPACT AND EFFECT PARAMETERS
USED ON THE ALTERNATIVE PLANS COMPARISON EXHIBITS

Economic

First Cost of Dredging Equipment: Includes the initial investment required to purchase additional dredging equipment such as booster pumps, floating pipe, shorepipe, fuel barges, etc. Also includes cost of providing access to remote disposal areas. Approximate 1973 price levels were used.

First Cost of Revegetation and Recreation: Includes initial cost of revegetation of dredged spoil areas and provision of recreation facilities at selected sites. Approximate 1973 price levels were used.

Average Annual Cost of Dredging: The annual cost of dredging within a specific pool or for all pools based on the unit cost of handling the materials, with the dredging equipment being used over the entire St. Paul District. The amortization of the original equipment over a 50-year period at 6-7/8 percent, operation, maintenance and replacement costs are included.

Annual Cost of Revegetation and Recreation: Includes the amortization of the initial costs of revegetation and recreation development over a 50-year period at 6-7/8 percent interest. Annual operation and maintenance costs are also included for the recreation developments.

Total Average Annual Cost: The sum of the average annual costs for dredging and revegetation and recreation developments.

Unit Cost per Cubic Yard: Based on the total average annual cost divided by the average annual volume of material dredged over the period 1956-1972.

Social Well Being

Public Health and Safety: Principally associated with navigation hazards, primarily in the main channel with changes in the length of discharge pipe.

Water Quality: Associated with turbidity, pollutants, or change in water circulation and subsequent affects of stagnation.

Mineral Resources: Associated with the availability of dredged material to various means of transportation out of the floodplain.

Social and Cultural Sites: Associated with areas or sites that tend to serve as a focal point for various social activities, including cemeteries, parks, buildings, etc.

Historical and Archaeological Sites: Associated with areas or sites which related to activities of social consequences which occurred in the recent or distant past.

Employment: Principally associated with a demand for labor related to dredging activities, tourism, or overall economic change.

Recreation: Associated with activities of leisure time or enjoyment, either consumptive or nonconsumptive.

Land Use

Agricultural: Lands devoted to raising crops or livestock.

Urban: Lands classified as either residential, commercial or industrial.

Park Land and Open Space: Land designated to spoiled areas devoid of vegetative cover and used for various recreational purposes.

Natural Habitat: Terrestrial or aquatic areas more or less existing in a natural state, or exempt from direct human influence such as dredged material deposition.

Natural Environment - Aquatic

Main Channel: The portion of the river through which large commercial craft can operate, a minimum depth of 9-feet and a minimum width of about 400 feet.

Channel Border: The zone between the main channel and the main river bank, islands, or submerged definitions of the old main river channel. This category also includes main side channels generally near and similar in nature to channel borders.

Tail Waters: Areas below the dams which are affected in turbulence by the passage of water through the gates of the dams and out of the locks.

River Lakes and Ponds: Open bodies of water which retain some connection with the river during normal water stages and in general have a slight current, bottoms of mud or silt, and may or may not contain rooted submerged or emergent types of aquatic vegetation.

Backwater Sloughs: Includes all of the remaining types of aquatic habitat found in river, principally associated with having no current at normal water stage.

Natural Environment - Terrestrial Habitat

Woodland, Brush and Shrubs: Primarily woody-stemmed plants typical of river bottoms or floodplain associations. Included are a wide spectrum of plant successional stages reflective of a deciduous dominance.

Grassland: Areas consisting primarily of grass species. Dredged spoil deposits would primarily reflect xeric types while more moist areas would consist of species associated with marsh types.

Open Sand Areas: Areas consisting of sand and little if any vegetative cover such as grasses or wood-stemmed plants, including dredge spoil areas.

Aquatic Animals: Species primarily associated with various types of aquatic habitats.

Terrestrial Animals: Species primarily associated with various types of terrestrial habitat.

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, UPPER AND LOWER ST. ANTHONY FALLS

	Alternative Plans (1): Status Quo	Remote Disposal	Remove from The Flood Plain
Economic			
First Cost of Dredging Equipment (2)	-	$1,880,000	$815,000
First Cost of Revegetation & Recreation	-	105,000	150,000
Average Annual Cost of Dredging (3)	$70,000	265,000	240,000
Average Annual Cost of Revegetation and Recreation (4)	-	10,000	16,000
Total Average Annual Cost	70,000	275,000	256,000
Unit Cost per Cubic Yard (5)	1.56	6.11	5.70 (6)
Social Well-Being			
Public Health and Safety	NC (7)	Decrease	Decrease
Water Quality	Increase	Increase	Increase
Mineral Resources	NC	NC	Increase
Social and Cultural Sites Affected	Decrease	Increase	Increase
Historic and Archeological Sites Affected	NC	NC	NC
Employment	NC	Increase	Increase
Recreation	Decrease	Increase	Increase
Land Use			
Agricultural (acres)	NC	NC	NC
Urban Development (acres)	NC	NC	NC
Parkland and Open Space (acres)	+ 10	NC	+ 5
Natural Habitat (acres)	- 10	NC	- 5
Natural Environment			
Aquatic Habitat (8)	- 10	-30	- 5
Backwaters - Sloughs (acres)	NC	-30	- 5
Channel Border (acres)	- 10	NC	NC
River Lakes and Ponds (acres)	NC	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC
Terrestrial Habitat (8) (acres)	+ 10	+30	+ 5
Woodland, Brush, and Shrubs (acres)	NC	NC	NC
Grassland (acres)	NC	+30	NC
Open Sand Areas (acres)	+ 10	NC	+ 5
Aquatic Animals (9)	Net Decrease	Net Decrease	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease
Terrestrial Animals (9)	Net Increase	Net Increase	Net Increase
Invertebrates	Net Increase	Net Increase	Net Increase
Mammals	Net Increase	Net Increase	Net Increase
Birds	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.

(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.

(3) Based on the unit cost of dredging for the amount of material dredged in this pool.

(4) Based 50-year amortization period and an interest rate of 6 7/8 percent

(5) Includes costs of dredging, revegetation, and recreation development.

(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.

(7) NC = No significant change

(8) Based on net changes over next fifty years of dredging activity.

(9) Based primarily on net habitat changes.

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ST. PAUL DISTRICT

EXHIBIT 195

IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL UPPER AND LOWER ST. ANTHONY FALLS

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 1

	Alternative Plans (1)		
	Status Quo	Remote Disposal	Remove from The Flood Plain
Economic			
First Cost of Dredging Equipment (2)	-	$1,690,000	$9,500,000
First Cost of Revegetation & Recreation	-	145,000	30,000
Average Annual Cost of Dredging (3)	$131,000	411,000	540,000
Average Annual Cost of Revegetation and Recreation (4)	-	11,000	3,000
Total Average Annual Cost (5)	131,000	422,000	543,000
Unit Cost per Cubic Yard (5)	1.14	3.67	4.72 (6)
Social Well-Being			
Public Health and Safety	NC (7)	Decrease	Decrease
Water Quality	Decrease	Increase	Increase
Mineral Resources	NC	NC	Increase
Social and Cultural Sites Affected	Decrease	Increase	Increase
Historic and ARcheological Sites Affected	NC	NC	NC
Employment	NC	Increase	Increase
Recreation	Decrease	Increase	Increase
Land Use			
Agricultural (acres)	NC	NC	NC
Urban Development (acres)	NC	NC	NC
Parkland and Open Space (acres)	+180	- 40	- 40
Natural Habitat (acres)	-180	+ 40	+ 40
Natural Environment (8)			
Aquatic Habitat (acres)	-160	- 75	NC
Backwaters - Sloughs (acres)	NC	- 75	NC
Channel Border (acres)	-160	NC	NC
River Lakes and Ponds (acres)	NC	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC
Terrestrial Habitat (8) (acres)	+160	+ 75	NC
Woodland, Brush, and Shrubs (acres)	- 20	+ 20	+ 20
Grassland (acres)	NC	+ 95	+ 20
Open Sand Areas (acres)	+180	- 40	- 40
Aquatic Animals (9)	Net Decrease	Net Decrease	NC
Invertebrates	Net Decrease	Net Decrease	NC
Mammals	Net Decrease	Net Decrease	NC
Birds	Net Decrease	Net Decrease	NC
Fish	Net Decrease	Net Decrease	NC
Reptiles and Amphibians	Net Decrease	Net Decrease	NC
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

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ST. PAUL DISTRICT

IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL POOL 1

EXHIBIT 196

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, MINNESOTA RIVER

	Alternative Plans (1)				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from The Flood Plain
Economic					
First Cost of Dredging Equipment (2)	-	$410,000	$410,000	$1,410,000	$1,500,000
First Cost of Revegetation & Recreation	-	100,000	40,000	30,000	-
Average Annual Cost of Dredging (3)	$47,000	80,000	100,000	160,000	258,000
Average Annual Cost of Revegetation and Recreation (4)	-	13,000	3,000	3,000	-
Total Average Annual Cost	47,000	93,000	103,000	163,000	258,000
Unit Cost per Cubic Yard (5)	1.56	3.10	3.43	5.43	8.60(6)
Social Well-Being					
Public Health and Safety	NC (7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	Decrease	Increase	Increase	Increase	Increase
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+ 60	+ 20	+ 5	- 5	+ 10
Natural Habitat (acres)	- 60	- 20	- 5	+ 5	- 10
Natural Environment					
Aquatic Habitat (8) (acres)	NC	NC	NC	NC	NC
Backwaters - Sloughs (acres)	NC	NC	NC	NC	NC
Channel Border (acres)	NC	NC	NC	NC	NC
River Lakes and Ponds (acres)	NC	NC	NC	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat (8) (acres)	NC	NC	NC	NC	NC
Woodland, Brush, and Shrubs (acres)	- 35	- 25	+ 5	- 15	NC
Grassland (acres)	- 25	+ 5	- 10	+ 20	- 10
Open Sand Areas (acres)	+ 60	+ 20	+ 5	- 5	+ 10
Aquatic Animals (9)	NC	NC	NC	NC	NC
Invertebrates	NC	NC	NC	NC	NC
Mammals	NC	NC	NC	NC	NC
Birds	NC	NC	NC	NC	NC
Fish	NC	NC	NC	NC	NC
Reptiles and Amphibians	NC	NC	NC	NC	NC
Terrestrial Animals (9)	Net Decrease	Net Decrease	Net Decrease	Net Increase	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	Net Increase	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	Net Increase	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	Net Increase	Net Decrease

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 197 IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL MINNESOTA RIVER

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 2

	Alternative Plans (1)				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from The Flood Plain
Economic					
First Cost of Dredging Equipment (2)	-	$5,900,000	$13,900,000	$28,000,000	$13,200,000
First Cost of Revegetation & Recreation	-	220,000	210,000	180,000	60,000
Average Annual Cost of Dredging (3)	$89,000	299,000	573,000	1,363,000	783,000
Average Annual Cost of Revegetation and Recreation (4)	-	16,000	15,000	13,000	5,000
Total Average Annual Cost	89,000	315,000	588,000	1,376,000	788,000
Unit Cost per Cubic Yard (5)	0.61	2.17	4.05	9.50	5.43 (6)
Social Well-Being					
Public Health and Safety	NC (7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	Increase	Increase
Social and Cultural Sites Affected	Decrease	Increase	Increase	Increase	Increase
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+265	- 65	- 75	- 75	- 65
Natural Habitat (acres)	-265	+ 65	+ 75	+ 75	+ 65
Natural Environment					
Aquatic Habitat (8) (acres)	NC	- 40	- 35	- 30	NC
Backwaters - Sloughs (acres)	NC	- 20	- 35	- 30	NC
Channel Border (acres)	NC	- 20	NC	NC	NC
River Lakes and Ponds (acres)	NC	NC	NC	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat (8) (acres)	NC	+ 40	+ 35	+ 30	NC
Woodland, Brush, and Shrubs (acres)	-265	-185	-170	-130	- 40
Grassland (acres)	NC	+290	+280	+235	+105
Open Sand Area (acres)	+265	- 65	- 75	- 75	- 65
Aquatic Animals (9)	NC	Net Decrease	Net Decrease	Net Decrease	NC
Invertebrates	NC	Net Decrease	Net Decrease	Net Decrease	NC
Mammals	NC	Net Decrease	Net Decrease	Net Decrease	NC
Birds	NC	Net Decrease	Net Decrease	Net Decrease	NC
Fish	NC	Net Decrease	Net Decrease	Net Decrease	NC
Reptiles and Amphibians	NC	Net Decrease	Net Decrease	Net Decrease	NC
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

CORPS OF ENGINEERS
ST. PAUL DISTRICT

IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL POOL 2

EXHIBIT 198

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, ST. CROIX RIVER

	Alternative Plans[1]				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from The Flood Plain
Economic					
First Cost of Dredging Equipment[2]	-	$1,400,000	$4,200,000	$18,500,000	$4,400,000
First Cost of Revegetation & Recreation	-	280,000	220,000	-	60,000
Average Annual Cost of Dredging[3]	$15,000	63,000	76,000	655,000	180,000
Average Annual Cost[4] of Revegetation and Recreation	-	41,000	34,000	-	10,000
Total Average Annual Cost[5]	15,000	104,000	110,000	655,000	190,000
Unit Cost per Cubic Yard	0.33	2.31	2.45	14.55	4.22[6]
Social Well-Being					
Public Health and Safety	NC[7]	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Decrease	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Decrease	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+ 55	+ 35	+ 30	NC	+ 20
Natural Habitat (acres)	- 55	- 35	- 30	NC	- 20
Natural Environment					
Aquatic Habitat[8] (acres)	- 55	- 70	- 70	NC	- 20
Backwaters - Sloughs (acres)	NC	NC	NC	NC	NC
Channel Border (acres)	- 50	- 65	- 65	NC	- 20
River Lakes and Ponds (acres)	- 5	- 5	- 5	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat[8] (acres)	+ 55	+ 70	+ 70	NC	+ 20
Woodland, Brush, and Shrubs (acres)	NC	+ 10	+ 15	- 25	NC
Grassland (acres)	NC	+ 25	+ 25	+ 25	NC
Open Sand Areas (acres)	+ 55	+ 35	+ 30	NC	+ 20
Aquatic Animals[9]	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Terrestrial Animals[9]	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

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EXHIBIT 199

IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL ST. CROIX RIVER

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 3

	Alternative Plans (1)				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from The Flood Plain
Economic					
First Cost of Dredging Equipment (2)	-	$5,200,000	$9,300,000	$18,200,000	$5,000,000
First Cost of Revegetation & Recreation	-	500,000	610,000	520,000	380,000
Average Annual Cost of Dredging (3)	$36,000	227,000	325,000	418,000	457,000
Average Annual Cost of Revegetation and Recreation (4)	-	53,000	64,000	52,000	39,000
Total Average Annual Cost (5)	36,000	280,000	389,000	470,000	496,000
Unit Cost per Cubic Yard	0.33	2.55	3.54	4.27	4.50 (6)
Social Well-Being					
Public Health and Safety	NC (7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	-40	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+225	+50	-20	+15	-10
Natural Habitat (acres)	-225	-50	+50	-15	+10
Natural Environment					
Aquatic Habitat (8) (acres)	- 70	-45	-15	-10	-30
Backwaters - Sloughs (acres)	- 15	-45	-15	-10	NC
Channel Border (acres)	- 55	NC	NC	NC	-30
River Lakes and Ponds (acres)	NC	NC	NC	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat (8) (acres)	+ 70	+45	+15	+10	+30
Woodland, Brush, and Shrubs (acres)	-155	-85	-35	-85	-15
Grassland (acres)	NC	+80	+60	+80	+55
Open Sand Areas (acres)	+225	+50	-10	+15	-10
Aquatic Animals (9)	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

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IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL POOL 3

EXHIBIT 200

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 4

	Alternative Plans (1)				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from the Flood Plain
Economic					
First Cost of Dredging Equipment (2)	-	$5,200,000	$6,700,000	$27,000,000	$13,700,000
First Cost of Revegetation & Recreation	-	1,300,000	1,400,000	1,200,000	600,000
Average Annual Cost of Dredging (3)	$97,000	578,000	670,000	1,530,000	1,630,000
Average Annual Cost of Revegetation and Recreation (4)	-	125,000	135,000	160,000	83,000
Total Average Annual Cost	97,000	703,000	805,000	1,690,000	1,713,000
Unit Cost per Cubic Yard (5)	0.33	2.38	2.73	5.73	5.80 (6)
Social Well-Being					
Public Health and Safety	NC (7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+485	-205	-260	-140	-220
Natural Habitat (acres)	-485	+205	+260	+140	+220
Natural Environment (8)					
Aquatic Habitat (acres)	-175	-155	-175	- 20	- 15
Backwaters - Sloughs (acres)	-145	-110	-135	- 20	- 10
Channel Border (acres)	- 15	- 5	NC	NC	- 5
River Lakes and Ponds (acres)	- 15	-40	- 40	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat (8) (acres)	+175	+155	+175	+ 20	+ 15
Woodland, Brush, and Shrubs (acres)	-310	+ 45	+120	- 80	+ 90
Grassland (acres)	NC	+315	+315	+240	+145
Open Sand Areas (acres)	+485	-205	-260	-140	-220
Aquatic Animals (9)	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

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EXHIBIT 201

IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL POOL 4

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 5

	Alternative Plans[1]				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from the Flood Plain
Economic					
First Cost of Dredging Equipment[2]	-	$2,300,000	$13,600,000	$17,900,000	$8,900,000
First Cost of Revegetation & Recreation	-	780,000	550,000	560,000	350,000
Average Annual Cost of Dredging[3]	$56,000	298,000	587,000	663,000	821,000
Average Annual Cost of Revegetation and Recreation[4]	-	76,000	51,000	52,000	33,000
Total Average Annual Cost[5]	56,000	374,000	638,000	715,000	854,000
Unit Cost per Cubic Yard	0.33	2.20	3.75	4.20	5.02[6]
Social Well-Being					
Public Health and Safety	NC[7]	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+350	-135	-135	-170	-225
Natural Habitat (acres)	-350	+135	+135	+170	+225
Natural Environment[8]					
Aquatic Habitat[8] (acres)	-160	-160	-165	-180	NC
Backwaters - Sloughs (acres)	-110	-115	-165	-180	NC
Channel Border (acres)	- 25	- 5	NC	NC	NC
River Lakes and Ponds (acres)	- 25	- 40	NC	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat[8] (acres)	+160	+160	+165	+180	NC
Woodland, Brush, and Shrubs (acres)	-190	+ 55	- 5	+ 30	+ 40
Grassland (acres)	NC	+240	+305	+320	+185
Open Sand Areas (acres)	+350	-135	-135	-170	-225
Aquatic Animals[9]	Net Decrease	Net Decrease	Net Decrease	Net Decrease	NC
Invertebrates	Net Decrease	Net Decrease	Net Decrease	Net Decrease	NC
Mammals	Net Decrease	Net Decrease	Net Decrease	Net Decrease	NC
Birds	Net Decrease	Net Decrease	Net Decrease	Net Decrease	NC
Fish	Net Decrease	Net Decrease	Net Decrease	Net Decrease	NC
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	Net Decrease	NC
Terrestrial Animals[9]	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

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IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL POOL 5

EXHIBIT 202

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 5A

	Alternative Plans (1)				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from the Flood Plain
Economic					
First Cost of Dredging Equipment (2)	-	$1,800,000	$8,900,000	$18,900,000	$8,900,000
First Cost of Revegetation & Recreation	-	610,000	405,000	310,000	250,000
Average Annual Cost of Dredging (3)	$33,000	155,000	275,000	495,000	500,000
Average Annual Cost of Revegetation and Recreation (4)	-	60,000	40,000	30,000	25,000
Total Average Annual Cost (5)	33,000	215,000	315,000	525,000	525,000
Unit Cost per Cubic Yard	0.33	2.15	3.15	5.25	5.25 (6)
Social Well-Being					
Public Health and Safety	NC (7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+175	- 80	-100	-100	- 50
Natural Habitat (acres)	-175	+ 80	+100	+100	+ 50
Natural Environment (8)					
Aquatic Habitat (8) (acres)	- 80	- 50	- 30	NC	- 10
Backwaters - Sloughs (acres)	- 55	- 35	- 30	NC	- 5
Channel Border (acres)	- 25	- 15	NC	NC	- 5
River Lakes and Ponds (acres)	NC	NC	NC	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat (8) (acres)	+ 80	+ 50	+ 30	NC	+ 10
Woodland, Brush, and Shrubs (acres)	- 90	+ 50	+ 75	+ 55	+ 25
Grassland (acres)	- 5	+ 80	+ 55	+ 45	+ 35
Open Sand Areas (acres)	+175	- 80	-100	-100	- 50
Aquatic Animals (9)	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

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EXHIBIT 203 IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL POOL 5A

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 6

	Alternative Plans (1)				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from The Flood Plain
Economic					
First Cost of Dredging Equipment (2)	-	$6,500,000	$9,900,000	$14,000,000	$13,500,000
First Cost of Revegetation & Recreation	-	270,000	345,000	330,000	340,000
Average Annual Cost of Dredging (3)	$17,000	198,000	183,000	190,000	265,000
Average Annual Cost (4) of Revegetation and Recreation	-	28,000	37,000	36,000	36,000
Total Average Annual Cost (5)	17,000	226,000	220,000	226,000	301,000
Unit Cost per Cubic Yard	0.33	4.52	4.40	4.52	6.02 (6)
Social Well-Being					
Public Health and Safety	NC (7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	+ 80	+100	+150	NC
Parkland and Open Space (acres)	+130	- 20	- 15	- 35	- 15
Natural Habitat (acres)	-130	- 60	- 85	-115	+ 15
Natural Environment (8)					
Aquatic Habitat (acres)	- 40	-115	-120	-150	- 20
Backwaters - Sloughs (acres)	NC	- 95	-100	-150	- 20
Channel Border (acres)	- 40	- 20	- 5	NC	NC
River Lakes and Ponds (acres)	NC	NC	- 15	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat (8) (acres)	+ 40	+115	+120	+150	+ 20
Woodland, Brush, and Shrubs (acres)	- 90	+ 15	+ 10	+ 15	+ 15
Grassland (acres)	NC	+ 40	+ 25	+ 20	+ 20
Open Sand Areas (acres)	+130	+ 60	+ 85	+115	- 15
Aquatic Animals (9)	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL POOL 6

EXHIBIT 204

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 7

	Alternative Plans (1)				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from The Flood Plain
Economic					
First Cost of Dredging Equipment (2)	-	$4,600,000	$13,400,000	$17,700,000	$8,700,000
First Cost of Revegetation & Recreation (3)	-	515,000	329,000	345,000	228,000
Average Annual Cost of Dredging	$31,000	171,000	342,000	395,000	442,000
Average Annual Cost of Revegetation and Recreation (4)	-	51,000	29,000	31,000	22,000
Total Average Annual Cost (5)	31,000	222,000	371,000	426,000	464,000
Unit Cost per Cubic Yard	.33	2.34	3.91	4.48	4.88 (6)
Social Well-Being					
Public Health and Safety	NC (7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+155	-35	-80	-90	-55
Natural Habitat (acres)	-155	+35	+80	+90	+55
Natural Environment (8)					
Aquatic Habitat (8) (acres)	- 95	-100	-50	-30	-35
Backwaters - Sloughs (acres)	- 10	NC	NC	-30	NC
Channel Border (acres)	- 75	-80	-25	NC	-35
River Lakes and Ponds (acres)	- 10	-20	-25	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat (8) (acres)	+ 95	+100	+50	+30	+35
Woodland, Brush, and Shrubs (acres)	- 60	+135	+130	+100	+75
Grassland (acres)	NC	NC	NC	+20	+15
Open Sand Areas (acres)	+155	-35	-80	-90	-55
Aquatic Animals (9)	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 205

IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 7

AD-A133 512 OPERATION AND MAINTENANCE 9-FOOT NAVIGATION CHANNEL UPPER MISSISSIPPI RIV..(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT AUG 74

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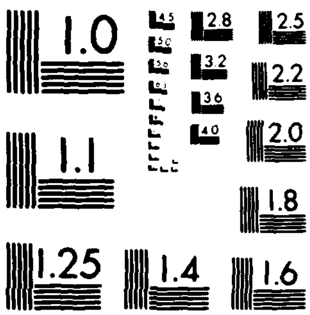

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 8

	Alternative Plans(1) Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from The Flood Plain
Economic					
First Cost of Dredging Equipment(2)	-	$4,900,000	$8,700,000	$22,400,000	$9,600,000
First Cost of Revegetation & Recreation	-	560,000	400,000	550,000	330,000
Average Annual Cost of Dredging(3)	$52,000	333,000	392,000	710,000	790,000
Average Annual Cost of Revegetation and Recreation(4)	-	52,000	37,000	51,000	22,000
Total Average Annual Cost	52,000	385,000	429,000	761,000	812,000
Unit Cost per Cubic Yard(5)	0.33	2.48	2.77	4.91	5.24(6)
Social Well-Being					
Public Health and Safety	NC(7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+275	-140	-155	-170	-110
Natural Habitat (acres)	-275	+140	+155	+170	+110
Natural Environment					
Aquatic Habitat(8) (acres)	-125	- 80	- 25	-170	- 15
Backwaters - Sloughs (acres)	- 50	- 45	- 15	- 20	- 5
Channel Border (acres)	- 45	- 35	NC	NC	NC
River Lakes and Ponds (acres)	- 30	NC	- 10	-150	- 10
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat(8) (acres)	+125	+ 80	+ 25	+170	+ 15
Woodland, Brush, and Shrubs (acres)	-150	- 5	- 10	+ 65	NC
Grassland (acres)	NC	+225	+190	+275	+125
Open Sand Areas (acres)	+275	-140	-155	-170	-110
Aquatic Animals(9)	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

CORPS OF ENGINEERS
ST. PAUL DISTRICT

IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL POOL 8

EXHIBIT 206

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 9

	Alternative Plans (1)				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from The Flood Plain
Economic					
First Cost of Dredging Equipment (2)	-	$5,900,000	$5,300,000	$27,000,000	$6,100,000
First Cost of Revegetation & Recreation	-	690,000	805,000	595,000	495,000
Average Annual Cost of Dredging (3)	$38,000	280,000	282,000	658,000	500,000
Average Annual Cost of Revegetation and Recreation (4)	-	70,000	79,000	57,000	50,000
Total Average Annual Cost	38,000	350,000	361,000	715,000	550,000
Unit Cost per Cubic Yard (5)	0.33	3.05	3.14	6.22	4.78(6)
Social Well-Being					
Public Health and Safety	NC (7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+215	- 65	- 95	-110	- 85
Natural Habitat (acres)	-215	+ 65	+ 95	+110	+ 85
Natural Environment					
Aquatic Habitat (8) (acres)	-120	- 75	- 35	- 5	- 20
Backwaters - Sloughs (acres)	- 80	- 70	- 30	- 5	- 10
Channel Border (acres)	- 35	NC	NC	NC	- 10
River Lakes and Ponds (acres)	- 5	- 5	- 5	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat (8) (acres)	+120	+ 75	+ 35	+ 5	+ 20
Woodland, Brush, and Shrubs (acres)	- 95	+ 15	- 15	- 20	+ 35
Grassland (acres)	NC	+125	+145	+135	+ 70
Open Sand Areas (acres)	+215	- 65	- 95	-110	- 85
Aquatic Animals (9)	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 207
IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL
POOL 9

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, POOL 10

	Alternative Plans (1)				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from The Flood Plain
Economic					
First Cost of Dredging Equipment (2)	-	$5,100,000	$6,000,000	$26,500,000	$5,500,000
First Cost of Revegetation & Recreation	-	540,000	600,000	460,000	230,000
Average Annual Cost of Dredging (3)	$25,000	148,000	170,000	518,000	345,000
Average Annual Cost of Revegetation and Recreation (4)	-	54,000	62,000	46,000	23,000
Total Average Annual Cost (5)	25,000	202,000	232,000	564,000	368,000
Unit Cost per Cubic Yard	0.33	2.70	3.10	7.52	4.90 (6)
Social Well-Being					
Public Health and Safety	NC (7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	NC	NC	NC
Urban Development (acres)	NC	NC	NC	NC	NC
Parkland and Open Space (acres)	+125	- 35	- 40	- 60	- 25
Natural Habitat (acres)	-125	+ 35	+ 40	+ 60	+ 25
Natural Environment (8)					
Aquatic Habitat (acres)	- 45	- 20	- 15	NC	- 5
Backwaters - Sloughs (acres)	NC	NC	NC	NC	NC
Channel Border (acres)	- 40	- 15	NC	NC	- 5
River Lakes and Ponds (acres)	- 5	- 5	- 15	NC	NC
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat (8) (acres)	+ 45	+ 20	+ 15	NC	+ 5
Woodland, Brush, and Shrubs (acres)	- 80	+ 10	+ 25	+ 10	+ 5
Grassland (acres)	NC	+ 45	+ 30	+ 50	+ 25
Open Sand Areas (acres)	+125	- 35	- 40	- 60	- 25
Aquatic Animals (9)	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	NC	Net Decrease
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in this pool.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

CORPS OF ENGINEERS — ST. PAUL DISTRICT

IMPACTS AND EFFECTS OF ALTERNATIVE MANAGEMENT PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL POOL 10

EXHIBIT 208

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS UPPER AND LOWER ST. ANTHONY FALLS POOLS(1)

Location in Pool(2)	Alternative Plans		
	Status Quo	Remote Disposal	Remove from Flood Plain
856.7	30(3)(.1W)(4)		10(.1W)
855.3	15(3)(.1W)		
4.5(5)		60(.3N)	
TOTAL	45	60	10

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1964-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Based on higher spoil areas than other alternative plans.
(4) Distance in miles and direction from the main channel location.
(5) Located on Minnesota River above confluence with Mississippi River.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 209

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS UPPER AND LOWER ST. ANTHONY FALLS POOLS

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL 1[1]

Location in Pool[2]	Alternative Plans		
	Status Quo	Remote Disposal	Remove from Flood Plain
847.9 - 853.0	200[3]		
850.9			10(.1E)[4]
5.0[5]		150(.5N)	
TOTAL	200	150	10

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above Ohio River.
(3) Consists of a continuous band about 200 feet wide along each side of the channel.
(4) Distance in miles and direction from the main channel.
(5) River Mile location on Minnesota River above the confluence with the Mississippi River.

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ST. PAUL DISTRICT

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL 1

EXHIBIT 210

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, MINNESOTA RIVER[1]

Location[2] in Pool	Alternative Plans				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
0.0	20(.4NE)[3]				
0.6		20(.1S)			
2.4			30(.3S)		5(.2S)
4.6	15(.1S)	15(.1S)			
6.2				45(.2N)	
11.3		20(.1S)	20(.3S)		
11.9	20(.2S)				
12.7					5(.1S)
13.3	5(.1NW)				
TOTAL	60	55	50	45	10

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1968-1972 as the basis for the projections.
(2) River Mile location in miles above Mississippi River.
(3) Distance in miles and direction from the main channel.

EXHIBIT 211

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, MINNESOTA RIVER

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS AND POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL 2[1]

Location in Pool[2]	Alternative Plans				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
845.0	20(.1S)[3]	20(.1SE)			
843.7	5(.1N)				
841.2	10(.1N)	20(.3SW)			10(.1N)
840.5	10(.1E)				
838.0	20(.1SW)				
836.5	100(.1W)	100(.1W)	140(.2W)		
835.8					10(.1W)
831.8	20(.5NW)[4]	15(.1W)			
829.2	20(.8SE)		30(.2E)		
827.7	10(.1W)	25(.3W)			10(.5W)
826.0				160(.5E)	
824.0	25(.1NW)				
823.0	5(.1S)	25(.2S)	35(.2S)		
819.1	20(.1S)	20(.1S)			10(.3SW)
TOTAL	265	225	205	160	40

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Distance in miles and direction from the main channel location.
(4) More than one location, the distance and direction given for the farthest.

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ST. PAUL DISTRICT

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL 2

EXHIBIT 212

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, ST. CROIX RIVER[1]

Location in Pool[2]	Alternative Plans				
	Status Quo	Selective Placement	Remote Disposal	Central[3] Disposal	Remove from Flood Plain
17.5	15(.2SE)[4]	15(.2SE)	35(.2NE)		10(.5E)
17.0	10(.1E)				
16.6	10(.2E)	20(.2NE)			
11.7	5(.3E)	5(.3E)	5(.3E)		
6.2	35(.2E)	35(.2E)	35(.2E)		
5.3					10(.2W)
TOTAL	75	75	75		20

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above Mississippi River.
(3) Site selected in Pool 3.
(4) Distance in miles and direction from the main channel location.

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 213
ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, ST. CROIX RIVER

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #3[1]

Location in Pool[2]	Alternative Plans				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
811.2	15(.2SW)[3]	25(.2W)			
810.2	15(.2NE)		35(.7SW)		10(.2NE)
808.7	20(.2E)	30(.5W)			10(.2E)
808.0	20(.1W)				
807.5	30(.1W)	25(.4SW)			
806.5			55(.5W)		
805.0	40(.1W)	30(.3SW)		170(.4SW)	10(.5SE)
802.7	10(.1NW)	40(.4SW)			
802.0	20(.2W)				
801.7	20(.2NE)		75(.1.2SW)		15(.5SE)
800.5	20(.3SW)				
800.3	10(.1E)				
799.5	10(.3W)	40(.5E)			
799.0	10(.1W)				
TOTAL	240	190	165	170	45

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Distance in miles and direction from the main channel location.

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ST. PAUL DISTRICT

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #3

EXHIBIT 214

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #4[1]

Location in Pool[2]	Alternative Plans: Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
795.0	25(.6NE)[4]	20(.5N)	20(1.0N)		
792.6	25(.1W)[4]	20(.1W)			
791.5			45(.1W)	100(.3W)	15(.5W)
790.0	25(.1N)[4]	30(.7NE)			
789.5	15(.1W)				
784.5	40(.1NE)	40(.4NE)	40(.4NE)		20(1.0W)
763	120(.5E)[4]	120(.5E)	120(1.0NE)		10(.4SE)
762	10(.2S)			240(2.0E)	
759	90(.2NE)[4]	90(.2NE)			10(.5SW)
757.7	40(.2NE)	70(.2NE)	140(.3NE)		
757.6	40(.1W)				
756.5	25(.3W)[4]	25(.3W)[4]			
756.0	15(.2W)	15(.2W)			
754.0	15(.2E)	15(.2E)	15(.2E)		15(.2E)
TOTAL	485	445	380	340	70

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Distance in miles and direction from the main channel location.
(4) More than one location, the distance and direction given for the farthest.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 215

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #4

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL 5[1]

Location in Pool[2]	Alternative Plans: Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
752.5	5(.1W)[3]	5(.1W)			
749.7	5(.1NE)				
749.0	25(.2SW)	25(.2SW)			
748.0	40(.2W)		50(.8NE)		
747.5	15(.1E)	40(.2E)			10(.9E)
746.8	5(.1E)				
746.2	40(.2W)	40(.2W)			
745.9	5(.1E)				
745.5	25(.2E)	40(.3E)	150(1.2W)	180(1.2W)	
745.0	60(.1W)	45(.5NW)			
744.5	25(.1E)				
744.2	50(.1W)	35(.5NW)			
743.0	40(.4NE)[4]	30(.2E)			10(.7SW)
741.5	10(.1W)	10(.3NE)			
TOTAL	350	270	200	180	20

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Distance in miles and direction from the main channel location.
(4) More than one location, the distance and direction given for the farthest.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL 5

EXHIBIT 216

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #5A[1]

Location in Pool[2]	Alternative Plans				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
738.0	5(.4E)[3]	5(.4NE)			
735.0	20(.2SE)[4]		80(1.0SW)		15(1.0SW)
734.5	25(.2N)	40(.3N)			
734.0	20(.3E)	15(.2NE)			
733.5	20(.3W)	20(.3SW)			
732.0	5(.4W)			130(2.0SW)	
731.5	25(.3S)	25(.2N)	60(.3N)		15(.2N)
730.0	30(.3N)	20(.3N)			
729.0	25(.3W)	25(.4W)			
TOTAL	175	150	140	130	30

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Distance in miles and direction from the main channel location.
(4) More than one location, the distance and direction given for the farthest.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 217

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #5A

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #6 (1)

Location in Pool (2)	Alternative Plans				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
728.0	15(.1W) (4)	10(.4W)			
726.4	10(.1E)		[illegible] (4)		
726.2		10([illegible]W)			
724.4	5(.1E)				
723.5	20(.2E)				
723.0	50(.3W) (4)	80([illegible]W)	100(.5W)	150(.5W)	20(.1W)
721.0	15(.2N) (4)	5([illegible]N)			
720.5	10(.1N)	15(1.0N)			
718.9	5(.1[illegible])	[illegible]			
718.3			[illegible] (4)		
TOTAL	130	125	125	150	20

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Distance in miles and direction from the main channel location.
(4) More than one location, the distance and direction given for the farthest.

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ST. PAUL DISTRICT

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #6

EXHIBIT 218

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #7[1]

Location in Pool[2]	Alternative Plans				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
712.6	10(.2E)[3]				
712.1	25(.1E)				
712.0	25(.2W)	60(.2W)			
711.6					15(.4W)
710.6	5(.2NE)		95(1.4E)		
709.0	20(.2E)				
708.5	25(.2W)	45(.3W)		130(1.0E)	5(.3SW)
706.6	15(.2W)	25(.3W)			15(.4NW)
706.5	15(.2E)				
704.5	25(.2E)	30(.3E)	50(.3E)		
703.5	5(.1E)				
TOTAL	170	160	145	130	35

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Distance in miles and direction from the main channel location.

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EXHIBIT 219

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #7

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL 8 (1)

Location in Pool (2)	Alternative Plans				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
700.2	10(.1E) (3)	10(.3NW)	10(.6W)		5(.2SW)
694.7	30(.2E) (4)	25(.3NW)			10(.8E)
693.2	5(.2E)	5(.2E)	95(.2W)		
692.5	5(.1E)	5(.1E)			
691	55(.6N) (4)	70(.5SE)			15(.6NW)
690.5	25(.2E)				
689.0	40(.2E)			180(1.0E)	
688.2	60(.2W) (4)	100(.2W)	110(.2W)		20(.3NW)
687.5	15(.1W)				
686.7	15(.1N)	15(.7N)			
684.8	5(.2NE)	10(.4SW)			
683.8	10(.4S)		10(.4W)		10(.5E)
TOTAL	275	240	225	180	60

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Distance in miles and direction from the main channel location.
(4) More than one location, the distance and direction given for the farthest.

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED
MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL 8

EXHIBIT 220

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL 9[1]

Location in Pool[2]	Alternative Plans				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
678.4	15(.3SW)[4]				10(.1E)[3]
677.8	20(.2E)	30(.4W)[4]			
676.2	25(.2W)	25(.5W)	55(.7NW)		
671.8	15(.3NW)[4]	10(.1SE)			10(.1SE)
671.2	15(.2NW)	15(.2NW)	25(.9W)		
669.5				140(1.5W)	
667.7	10(.1SW)	10(.2NW)	10(.5W)		5(.1E)
665.5	35(.2W)		80(.4E)		
665.0	10(.1SE)	45(.5SE)			
664.5	55(.3W)[4]	40(.3W)			
663.6					10(.4NW)
660.2	10(.2W)		10(.5N)		5(.2SW)
659.0		10(.2E)			
654.0	5(.3SE)	5(.2E)	5(.2E)		
TOTAL	215	190	185	140	40

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Distance in miles and direction from the main channel location.
(4) More than one location, the distance and direction given for the farthest.

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EXHIBIT 221

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #9

ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #10[1]

Location in Pool[2]	Alternative Plans				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from Flood Plain
646.4					10(.2E)[3]
646.3	25(.1E)				
646.0		25(.2W)[3]			
644.8		25(.2W)	60(.3W)		
644.3	35(.3SW)[4]				
643.0	25(.2E)[4]	20(.2SE)			10(.3E)
642.3				90(.4E)	
633.7		5(.4E)	5(.4E)		
633.4	5(.3NE)				5(.1W)
629.0	5(.2E)				
628.0	15(.2W)				10(.3SE)
627.3	15(.2E)	25(.2E)	25(.4SW)		
619.0	15(.4SW)[4]		10(.4NW)		10(.8E)
618.0		10(.2NW)			
TOTAL	140	110	100	90	45

(1) Based on estimated dredging requirements for the next 50 years, using the period from 1956-1972 as the basis for the projections.
(2) River Mile location in miles above the Ohio River.
(3) Distance in miles and direction from the main channel location.
(4) More than one location, the distance and direction given for the farthest.

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ESTIMATED ACREAGE REQUIREMENTS AND LOCATIONS FOR FUTURE DREDGED MATERIALS FOR POSSIBLE ALTERNATIVE MANAGEMENT PLANS, POOL #10

EXHIBIT 222

IDENTIFICATION OF ALTERNATIVE MEASURES HAVING GREATEST POTENTIAL FOR REDUCING ADVERSE ENVIRONMENTAL IMPACTS

Alternative Measures	Navigation Pools													
	U&LSAF(1)	1	Mn.R.(2)	2	St.C.(3)	3	4	5	5A	6	7	8(4)	9	10
Erosion & Sediment Control														
Upstream Watershed Treatment			X											
Sediment Control Structures							X							
Confined Disposal Areas														
Shore Protection - Disposal Areas														
Revegetation - Disposal Areas			X	X	X	X	X	X	X		X	X	X	X
Placement of Dredged Material														
Selective Placement			X	X	X	X	X	X	X	X	X	X	X	X
Remote Disposal	X	X	X						X	X	X			
Central Disposal														
Remove from Flood Plain	X	X		X	X	X			X			X		
Dredge Operations														
Type of Dredge			X											
Cutterhead														
Size of Dredge Cut							X	X	X			X		
Dredge Openings to Backwaters						X	X	X			X		X	
Expansion of Dredge Capability						X	X	X	X	X	X	X	X	X
Dam Operations														
Change Water Levels in Pool								X			X			
Change Control Point in Pool														X
Provide Fish Passageways														
Provide Low Flow Outlets														
Lock Operations														
Revise Locking Priorities						X			X		X			
Provide Other Passages for Recreation Craft														
Use of Dredged Material														
Commercial Commodity	X	X		X	X	X			X	X		X		
Recreation Beaches		X			X	X	X	X	X	X	X	X	X	X
Wildlife Habitat			X			X	X	X	X		X	X	X	X

(1) Includes both Upper and Lower St. Anthony Falls Pools.
(2) Minnesota River
(3) St. Croix River
(4) Pool 8 including the Black River.

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ST. PAUL DISTRICT

EXHIBIT 223

IDENTIFICATION OF ALTERNATIVE MEASURES HAVING GREATEST POTENTIAL FOR REDUCING ADVERSE ENVIRONMENTAL IMPACTS

RELATIONSHIP OF EXISTING AUTHORITY TO POSSIBLE IMPLEMENTATION OF ALTERNATIVE MEASURES(1)

Alternative Measures	Status of Authorization: Within Existing Authority(2)	Status of Authorization: Questionable Status of Authority(3)	Status of Authorization: No Existing Authority(4)
Erosion & Sediment Control			
Upstream Watershed Treatment	X(5)		
Sediment Control Structures			X
Confined Disposal Areas		X	
Shore Protection - Disposal Areas		X	
Revegetation - Disposal Areas	X		
Placement of Dredged Material			
Selective Placement	X		
Remote Disposal	X		
Central Disposal	X		
Remove from Flood Plain	X		
Dredge Operations			
Type of Dredge	X(6)		
Cutterhead	X(6)		
Size of Dredge Cut	X		
Dredge Openings to Backwaters		X	
Expansion of Dredge Capability	X(6)		
Dam Operations			
Change Water Levels in Pool			X
Change Control Point in Pool	X		
Provide Fish Passageways	X		
Provide Low Flow Outlets	X		
Lock Operations			
Revise Locking Priorities	X		
Provide Other Passages for Recreation Craft			X
Use of Dredged Material			
Commercial Commodity	X		
Recreation Beaches	X		
Wildlife Habitat	X		

(1) Refers to Congressional authority, is not necessarily consistent with the Corps of Engineers policy as stated in ER 1130-2-307 and other regulations.
(2) Implementation of measure would be within existing authorities subject to justification of the action and allocation of funds.
(3) Basic authority does not specifically include or exclude action, and existing interpretations of authorities do not clarify the status.
(4) Existing authorities and/or interpretations of authorities exclude these actions. A new authorization would be required to implement measure. Justification and funding would also be required.
(5) The principal authorities for these types of actions are with other agencies and interests.
(6) Congress has imposed a moratorium on purchase of new dredging equipment. Any consideration of new equipment would fall under the guidelines of the moratorium.

RELATIONSHIP OF EXISTING AUTHORITY TO POSSIBLE IMPLEMENTATION OF ALTERNATIVE MEASURES(1)

EXHIBIT 224

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL, ALL POOLS - ST. PAUL DISTRICT

	Alternative Plans (1)				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Remove from The Flood Plain
Economic					
First Cost of Dredging Equipment (2)	-	$11,000,000	$22,000,000	$36,800,000	$18,400,000
First Cost of Revegetation & Recreation	-	6,400,000	6,200,000	5,300,000	3,500,000
Average Annual Cost of Dredging (3)	$740,000	3,030,000	4,650,000	8,400,000	7,750,000
Average Annual Cost of Revegetation and Recreation (4)	-	640,000	610,000	550,000	370,000
Total Average Annual Cost	740,000	3,670,000	5,260,000	8,950,000	8,120,000
Unit Cost per Cubic Yard (5)	0.50	2.45	3.50	5.95	5.40 (6)
Social Well-Being					
Public Health and Safety	NC (7)	Decrease	Decrease	Decrease	Decrease
Water Quality	Decrease	Increase	Increase	Increase	Increase
Mineral Resources	NC	NC	NC	NC	Increase
Social and Cultural Sites Affected	NC	NC	NC	NC	NC
Historic and Archeological Sites Affected	NC	NC	NC	NC	NC
Employment	NC	Increase	Increase	Increase	Increase
Recreation	Decrease	Increase	Increase	Increase	Increase
Land Use					
Agricultural (acres)	NC	NC	- 40	NC	NC
Urban Development (acres)	NC	+ 80	+100	+150	NC
Parkland and Open Space (acres)	+2705	-675	-970	-940	-865
Natural Habitat (acres)	-2705	+595	+910	+790	+865
Natural Environment					
Aquatic Habitat (8) (acres)	-1135	-910	-735	-595	-175
Backwaters - Sloughs (acres)	- 465	-535	-525	-445	- 55
Channel Border (acres)	- 575	-260	- 95	NC	-110
River Lakes and Ponds (acres)	- 95	-115	-115	-150	- 10
Tailwaters & Main Channel (acres)	NC	NC	NC	NC	NC
Terrestrial Habitat (8) (acres)	+1135	+910	+735	+595	+175
Woodland, Brush, and Shrubs (acres)	-1540	+ 35	+165	- 80	+270
Grassland (acres)	- 30	+1470	+1440	+1465	+770
Open Sand Areas (acres)	+2705	-595	-870	-790	-865
Aquatic Animals (9)	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Invertebrates	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Mammals	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Birds	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Fish	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Reptiles and Amphibians	Net Decrease	Net Decrease	Net Decrease	Net Decrease	Net Decrease
Terrestrial Animals (9)	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Invertebrates	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Mammals	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase
Birds	Net Decrease	Net Increase	Net Increase	Net Increase	Net Increase

(1) Refer to narrative descriptions of alternative plans for detailed physical description.
(2) Based on total amount of dredging equipment needed in addition to present plant at about 1973 price levels.
(3) Based on the unit cost of dredging for the amount of material dredged in these pools.
(4) Based 50-year amortization period and an interest rate of 6 7/8 percent.
(5) Includes costs of dredging, revegetation, and recreation development.
(6) Includes a unit cost of $2.25 to remove material from stockpile area a distance of about twenty-five miles.
(7) NC = No significant change.
(8) Based on net changes over next fifty years of dredging activity.
(9) Based primarily on net habitat changes.

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ST. PAUL DISTRICT

EXHIBIT 225

IMPACTS AND EFFECTS OF POSSIBLE ALTERNATIVE PLANS FOR OPERATION AND MAINTENANCE OF NINE-FOOT NAVIGATION CHANNEL ALL POOLS - ST. PAUL DISTRICT

ESTIMATED ACREAGE REQUIRED PER POOL FOR FUTURE DREDGED SPOIL MATERIAL BY ALTERNATIVE DISPOSAL PLAN(1)

Pool	Estimated Acreage Required Per Alternative Plan				
	Status Quo	Selective Placement	Remote Disposal	Central Disposal	Removal from Flood Plain
U & L SAF(2)	45	45	60(3)	60(3)	10
1	200	200	150(3)	150(3)	10
Minnesota River	60	55	50	45	10
2	265	225	205	160	40
St. Croix River	75	75	75	50(4)	20
3	240	190	165	120	45
4	485	445	380	340	70
5	350	270	200	180	20
5A	175	150	140	130	30
6	130	125	125	150(5)	20
7	170	160	145	130	35
8	275	240	225	180	60
9	215	190	185	140	40
10	140	110	100	90	45
TOTAL	2,825	2,480	2,205	1,925	455

(1) Based on area required for 50 years of future dredging.
(2) Upper and Lower St. Anthony Falls.
(3) Site located in Minnesota River flood plain.
(4) Located in pool 3 at same location as the central disposal site for pool 3.
(5) One-half normal height.

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ESTIMATED ACREAGE REQUIRED PER POOL FOR FUTURE DREDGED SPOIL MATERIAL BY ALTERNATIVE DISPOSAL PLAN

EXHIBIT 226

JUN 1 3 1973

UNITED STATES DISTRICT COURT
FOR THE
WESTERN DISTRICT OF WISCONSIN

STATE OF WISCONSIN,

Plaintiff,

vs.

HOWARD H. CALLAWAY, Secretary
Department of the Army
United States of America
The Pentagon
Washington, D.C. 20301

COMPLAINT

Civil Action File No.

CORPS OF ENGINEERS
Department of the Army
Washington, D.C. 20314

LT. GEN. FREDERICK CLARKE
Chief of Engineers
Department of the Army
Washington, D.C. 20314

COLONEL RODNEY E. COX
District Engineer
Corp of Engineers, St. Paul District
1210 U.S. Post Office and Customs House
St. Paul, Minnesota 55101

Defendants.

NOW COMES THE PLAINTIFF, State of Wisconsin, by Robert W. Warren, Attorney General, and Richard J. Boyd, Assistant Attorney General, and for causes of action against the defendants respectfully alleges and shows the court as follows:

JURISDICTION

1. This action arises under 23 U.S.C. Section 1331; 42 U.S.C. Section 4332; and 5 U.S.C. Section 702; 16 U.S.C. Section 662 (a); 33 U.S.C. Section 540;38 U.S.C. Section 1337. The amount in controversy exceeds, exclusive of interest and costs, the sum of Ten Thousand ($10,000.00) Dollars.

EXHIBIT 227 COMPLAINT FILED BY STATE OF WISCONSIN

2. Plaintiff State of Wisconsin brings this action by and through Robert W. Warren, Attorney General for the State of Wisconsin at the request of Governor Patrick J. Lucey, pursuant to sec. 165.25 (1), Wis. Stats.

NATURE OF ACTION

This is an action for injunctive relief arising out of the failure of the defendants Howard H. Callaway, Secretary of the Army; Corps of Engineers, United States Army; Lieutenant General Frederick J. Clarke, Chief of Engineers; and Colonel Rodney E. Cox, District Engineer, to:

a. File an environmental impact statement as required by the National Environmental Policy Act of 1969, 42 U.S.C. Section 4331, et seq;

b. comply with revised Engineer Regulation No. 1105-2-507, dated February 16, 1973, and printed in the Federal Register (38 Fed. Reg. 9242, April 12, 1973);

c. comply with the spirit and mandate of Executive Order No. 11514 issued March 5, 1970;

d. comply with specific portions of the Environmental Guidelines for the Civil Works Program of the Corps of Engineers dated November 30, 1970;

e. comply with the requirements of 16 U.S.C. Section 662 (a);

f. comply with the requirements of 33 U.S.C. Section 540, and

g. comply with the spirit and mandate of Executive Order No. 11296, issued August 11, 1966.

PARTIES

4. Plaintiff, State of Wisconsin, is a sovereign State of the United States of America and by and through its Department of Natural Resources, has the duty and obligation to protect,

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ST. PAUL DISTRICT

maintain and improve the quality and management of waters of the State, which it holds in trust for all its citizens.

5. Defendant Howard H. Callaway, is Secretary of the Army of the United States and is an officer of the United States vested with authority over the operations of the United States Army.

6. Defendant, Corps of Engineers, United States Army, hereinafter referred to as the "Corps," was created by the United States Congress' enactment of 10 U.S.C. Section 3063. The Corps has its principal place of business in Washington, D.C.

7. Defendant, Lieutenant General Frederick J. Clarke, is the Chief of Engineers, Department of the Army, and is vested with authority over the operations of the Corps.

8. Defendant, Rodney E. Cox, is the Chief Engineer of the St. Paul District which includes Corps operations on the upper Mississippi River and is vested with the authority over the operations of the Corps in the St. Paul District.

9. The authority of these defendants herein to carry out their functions is limited by laws, rules, and regulations; accordingly, the defendants herein must comply with these laws, rules and regulations with respect to the dredging and spoil disposal operations in question and to the extent that they act beyond and contrary to such laws their actions, individually and jointly are ultra vires. The individual defendants herein have been and continue to be responsible for the failures herein alleged. Therefore, relief is sought against the defendants herein to enjoin said defendants from a continuation of this project in the manner in which it is being conducted.

GENERAL ALLEGATIONS

10. Plaintiff, State of Wisconsin, states that the defendant Corps began dredging portions approximately a half mile long in or near the center of the Mississippi River bed channel, approximately a mile north of Brownsville, Minnesota, on June 18, 1973, for the purpose of improving commercial navigation on the River.

11. Attached to this complaint as if fully set out herein at length is a copy of a map issued by the Corps and made available to the Wisconsin Department of Natural Resources, and marked "Exhibit A." This map contains rectangular sketchings by the Corps which indicates the portions to be dredged. Other pertinent information contained therein is spoil disposal areas, estimated quantity of dredged spoil materials to be removed from the channel and a cross section profile of river channel depth readings.

12. The plaintiff, State of Wisconsin, states that the portion of the channel to be dredged is located in the main channel of the Mississippi River between "river mile" 690.4 to "river mile" 690.7 above Brownsville, Minnesota. Attached to this complaint as if fully set out herein at length is a copy of Corps document entitled "Local Notice to Navigation Interests"-Mississippi River Dredging Schedule 1973, as "Exhibit B."

13. Large quantities of spoil materials consisting primarily of sand have been dredged and deposited on a small island, lying in the Mississippi River, and in waters surrounding said island, between river miles 689.7 and 690.6, within the boundaries of the State of Wisconsin, Section 6, Township 14N, R7W, Town of Bergen, Vernon County, Wisconsin, and affecting waters held in trust by plaintiff as aforesaid.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

14. The plaintiff, State of Wisconsin, has reasonable ground to believe that the dredging operation will last a period of seven days and that a total of approximately 138,000 cubic yards of river bottom spoil material will be deposited on said island and surrounding waters located in the Mississippi River as aforesaid.

15. The method of disposal is such that the spoil material is placed on said island and surrounding water area, with an unconfined runoff. As the sand is deposited on the island it spills out into adjoining waterways, which are the main channel, a running slough, and a back water area which has high ecological values which may be destroyed by the sand and spoil material. These high ecological values include, but are not limited to, areas which have a high fishery and wildlife value. Also, important established commercial seine haul areas may be eliminated on the southerly tip of said island and in the immediate area south.

16. Runoff of the unconfined spoil material will ultimately have deleterious and adverse effects on a variety of species of fish which spawn, rear, nest and feed in the immediate vicinity of this dredging and spoil depositing operation. Consequently, the sand and spoil runoff will cause serous and irreparable harm to fish and wildlife habitat, to recreational navigation in shallow areas of the River, and to the quality of the water of the River. In short, this dredging operation will have a major and profound impact upon the environment.

FIRST CLAIM

17. Section 102 of the National Environmental Policy Act, 42 U.S.C. Section 4332, provides as follows:

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 227

"The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this chapter, and (2) all agencies of the Federal Government shall--

"(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

"(B) identify and develop methods and procedures, in consulation with the Council on Environmental Quality established by sub-chapter II of this chapter, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

"C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on --

"(i) the environmental impact of the proposed action,

"(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

"(iii) alternatives to the proposed action,

"(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

"(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement the responsible Federal official shall consult with and obtain the comments of and Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of Title 5, and shall accompany the proposal through the existing agency review processes;

"(D) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

"(E) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

"(F) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

"(G) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

"(H) assist the Council on Environmental Quality established by subchapter II of this chapter."

18. The project in question falls within the ambit and requirements enumerated in Section 102 of the Act as set forth above, in paragraph 17.

19. The defendant Corps has not filed the required statement of environmental impact, and has not utilized a systematic interdisciplinary approach in its decision making with respect to the dredging and spoil removal as above set forth, and has not identified or developed methods or procedures which in consultations with the Council on Environmental Quality will ensure that unquantified environmental amenities and values may be given appropriate consideration in decisionmaking.

20. Plaintiff states that unless the defendants are enjoined and restrained from continuing the unlawful acts complained of in paragraphs 10 through 16, herein, the defendants will continue to so violate Section 102 of the National Environmental Policy Act of 1969. If the defendants are permitted to continue their unlawful acts they will cause permanent damage to a portion of the environment in the State of Wisconsin.

21. Plaintiff has no other adequate remedy at law.

SECOND CLAIM

22. On February 16, 1973, the Corps issued Regulation No. 1105-2-507, entitled Preparation and Coordination of Environmental Statements. This Regulation was printed in the Federal Register at 38 Fed. Reg. 9242, on April 12, 1973. Attached to this Complaint as if fully set out herein at length is a copy of Regulation No. 1105-2-507, as "Exhibit C."

23. The defendants, Corps of Engineers, United States Army; Howard H. Callaway, Secretary of the Army; Lieutenant General Frederick J. Clarke, Chief of Engineers; and Colonel Rodney E. Cox, District Engineer, have failed to comply with its own regulation insofar as it pertains to the preparation of an environmental impact statement with respect to the dredging and spoil deposit project on the Mississippi River.

24. On March 5, 1970, Executive Order No. 11514, entitled Protection and Enhancement of Environmental Quality, was issued by the President of the United States, directing Federal agencies in the implementation of the National Environmental Policy Act of 1969. Attached to this Complaint as if fully set out herein at length is a copy of Executive Order No. 11514, as "Exhibit D."

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25. The defendants, Corps of Engineers, United States Army; Howard H. Callaway, Secretary of the Army; Lieutenant General Frederick J. Clarke, Chief of Engineers; and Colonel Rodney E. Cox, District Engineer, have failed to comply with the mandate of Executive Order 11514 insofar as this activity and project by the Corps has not been calculated to enhance the quality of the environment. Other provisions of the Order have also been contravened and they include, but are not limited to, consultation with the appropriate State Agency [illegible]

[illegible]

on the heads of executive agencies to "provide leadership in encouraging a broad and unified effort to prevent uneconomic areas and development of the Nation's flood plains and, in particular, to lessen the risk of flood basin in connection with federal lands and installations and federally financed or supported improvements." Attached to this Complaint as if fully set out herein at length is a copy of Executive Order No. 11296, as "Exhibit F."

29. The channel dredging and spoils deposit operation herein mentioned is within the ambit and requirements of Executive Order No. 11296.

30. The operation of the channel dredging and spoils deposit project in the Mississippi River near Brownsville, Minnesota, is not within the spirit and mandate of Executive Order 11296, in that the deposit of the spoils on the island within the flood plain constitutes a serious and irreparable threat to the capability of the flood plaint to receive above normal water levels, presenting an increased danger of flood losses downstream.

31. Defendants, Corps of Engineers, United States Army; Howard H. Callaway, Secretary of the Army; Lieutenant General Frederick J. Clarke, Chief of Engineers; and Colonel Rodney E. Cox, District Engineer, have failed to comply with the spirit and mandate of Executive Order No. 11296.

THIRD CLAIM

32. 16 U.S.C. Section 662 (a) provides as follows:

> "Except as hereafter stated in subsection (h) of this section, whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose

CORPS OF ENGINEERS
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whatever, including navigation and drainage, by any department or agency of the United States, or by any public or private agency under Federal permit or license, such department or agency first shall consult with the United States Fish and Wildlife Service, Department of the Interior, and with the head of the agency exercising administration over the wildlife resources of the particular State wherein the impoundment, diversion, or other control facility is to be constructed, with a view to the conservation of wildlife resources by preventing loss of and damage to such resources as well as providing for the development and improvement thereof in connection with such water-resource development."

33. The channel dredging operation herein mentioned falls within the ambit and requirements of 16 U.S.C. Section 662 (a).

34. Defendants have not complied with the requirements of 16 U.S.C. Section 662 (a).

35. Plaintiff has no adequate remedy at law.

FOURTH CLAIM

36. 33 U.S.C. Section 540 provides as follows:

"Federal investigations and improvements of rivers, harbors, and other waterways shall be under the jurisdiction of and shall be prosecuted by the Department of the Army under the direction of the Secretary of the Army and the supervision of the Chief of Engineers, except as otherwise specifically provided by Act of Congress, which said investigations and improvements shall include a due regard for wildlife conservation."

37. The channel dredging operation herein mentioned falls within the ambit and requirements of 33 U.S.C. Section 540.

38. Defendants have failed to include a "due regard for wildlife conservation" in this channel improvement operation, as required by 33 U.S.C. Section 540.

CORPS OF ENGINEERS
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39. Plaintiff has no adequate remedy at law.

WHEREFORE, plaintiff prays for judgment as follows:

1. On plaintiff's First Claim, (paragraphs numbered 17 through 21 herein), that the defendants Howard H. Callaway, Secretary of the Army; Corps of Engineers, United States Army; Lieutenant General Frederick J. Clarke, Chief of Engineers; and Colonel Rodney E. Cox, District Engineer, their agents, servants and employees:

a. be jointly and severally permanently restrained from proceeding with the dredging and spoil deposit operation until compliance with 42 U.S.C. Section 4332, is accomplished, or,

b. in the alternative, restrained from proceeding with dredging or spoil deposit until sites which will have minimal adverse environmental affects have been selected in consultation with the Wisconsin Department of Natural Resources and approved by it.

2. On plaintiff's Second Claim, (paragraphs 22 through 31 herein), that the defendants be jointly and severally restrained from proceeding with dredging or spoil deposit until sites which will have minimal adverse environmental affects have been selected in consultation with the Wisconsin Department of Natural Resources and approved by it.

3. On plaintiff's Third Claim (paragraphs 32 through 35 herein) that the defendants be jointly and severally restrained from proceeding with the channel deepening operation in the Mississippi River bed channel near Brownsville, Minnesota, until

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such time as the provisions and requirements of 16 U.S.C. Section 662 (a) are met.

4. On plaintiff's Fourth Claim (paragraphs 36 through 39 herein) that the defendants be jointly and severally restrained from proceeding with the channel improvement operation in the Mississippi River near Brownsville, Minnesota, until such time as these improvements include a due regard for wildlife conservation as required by 33 U.S.C. Section 540.

5. That defendants pay the costs herein expended, and

6. For any and all other proper orders and appropriate relief to which plaintiff may be entitled.

Respectfully submitted,

Robert W. Warren

ROBERT W. WARREN
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State of Wisconsin

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Richard J. Boyd

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Counsel for Plaintiff
State of Wisconsin

STATE OF WISCONSIN)
) SS
COUNTY OF DANE)

I, Richard J. Boyd, first being duly sworn, state on oath that I am one of the attorneys for the plaintiff herein; that I am familiar with the contents of the foregoing complaint; and, that the allegations made therein are true and correct to the best of my information, knowledge, and belief.

Subscribed and sworn to before me this 19th day of June, 1973.

Richard J. Boyd
RICHARD J. BOYD

Notary Public, My Commission is permanent.

CORPS OF ENGINEERS
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EXHIBIT 227

IN THE UNITED STATES DISTRICT COURT

FOR THE WESTERN DISTRICT OF WISCONSIN

STATE OF WISCONSIN, Plaintiff, -v- HOWARD H. CALLAWAY, Secretary Department of the Army United States of America The Pentagon Washington, D. C. 20301 CORPS OF ENGINEERS Department of the Army Washington, D. C. 20314 LT. GEN. FREDERICK J. CLARKE Chief of Engineers Department of the Army Washington, D. C. 20314 COLONEL RODNEY E. COX District Engineer Corps of Engineers, St. Paul District 1210 U. S. Post Office and Customs House St. Paul, Minnesota 55101, Defendants.	*	ANSWER No. 73-C-183

The defendants, by their attorney John O. Olson, United States Attorney for the Western District of Wisconsin, in answer to plaintiff's amended complaint, allege that:

1. Defendants are without sufficient information to form a belief as to the truth of the allegations of paragraphs one (1) and two (2) of the plaintiff's complaint, and therefore deny the same.

2. Deny the allegations contained in paragraph three (3) of the complaint.

3. Defendants admit that plaintiff is a sovereign state of the United States of America and deny sufficient information to form a belief as to the truth of the other allegations of paragraph four (4) of the complaint.

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ANSWER FILED BY U. S. GOVERNMENT

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4. Admit the allegations of paragraph five (5) of the complaint.

5. Admit that the office of the Chief of Engineers is located in Washington, D. C. and defendants deny all other allegations in paragraph six (6) of the complaint.

6. Defendants affirmatively allege that Lieutenant General Frederick J. Clarke is no longer Chief of Engineers and that Lieutenant General William C. Gribble is the Chief of Engineers as of August 1, 1973. Pursuant to Rule 25(d)(1), Federal Rules of Civil Procedure, the name of General Gribble has been substituted for that of General Clarke. The defendants deny any interpretation plaintiff attempts to make in paragraph seven (7) regarding the authority of the Chief of Engineers.

7. Defendants affirmatively allege that Colonel Rodney E. Cox is the District Engineer for the St. Paul District, Corps of Engineers, and that the St. Paul District includes that segment of the Mississippi River from its headwaters to Guttenberg, Iowa. The defendants deny any interpretation plaintiff attempts to make in paragraph eight (8) regarding the authority of the District Engineer.

8. Defendants affirmatively allege that they act in an official capacity subject to the laws then in force. Any allegations of paragraph nine (9) of plaintiff's complaint not previously answered are hereby denied.

9. Deny the allegations of paragraph ten (10) of the complaint.

10. Admit the allegations of paragraphs eleven (11) and twelve (12) of the complaint.

11. Deny the allegations of paragraphs thirteen (13) through eighteen (18) of the complaint.

12. Admit the allegations of paragraph nineteen (19) of the complaint.

13. Deny the allegations of paragraphs twenty (20) through twenty-two (22) of the complaint.

14. Defendants are without sufficient information to form a belief as to the truth of the allegations of paragraph twenty-three (23) of plaintiff's complaint, and therefore deny the same.

15. Defendants admit the factual allegations relative to Regulation Number 1105-2-507, but defendants deny any interpretation the

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plaintiff attempts to make in paragraph twenty-four (24) regarding the provisions of that Regulation.

16. Deny the allegations of paragraph twenty-five (25) of the complaint.

17. Defendants admit that Executive Order 11514 was issued on March 5, 1970. Any allegations of paragraph twenty-six (26) not previously answered are hereby denied.

18. Deny the allegations of paragraph twenty-seven (27) of the complaint.

19. Admit the allegations of paragraph twenty-eight (28) of the complaint.

20. Deny the allegations of paragraph twenty-nine (29) of the complaint.

21. Paragraph thirty (30) of plaintiff's complaint states conclusions of law and need not be answered.

22. Paragraph thirty-one (31) of plaintiff's complaint states conclusions of law and need not be answered.

23. Deny the allegations of paragraph thirty-two (32) and thirty-three (33) of the complaint.

24. Admit the allegations of paragraph thirty-four (34) of the complaint.

25. Paragraph thirty-five (35) of the plaintiff's complaint states conclusions of law and need not be answered.

26. Deny the allegations of paragraph thirty-six (36) of the complaint.

27. Admit the allegations of paragraph thirty-seven (37) of the complaint.

28. Paragraph thirty-eight (38) of plaintiff's complaint states conclusions of law and need not be answered.

29. Deny the allegations of paragraph thirty-nine (39) of the complaint.

30. Defendants are without sufficient information to form a belief as to the truth of the averments in paragraph forty (40) of plaintiff's complaint, and therefore deny the same.

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31. Admit the allegations of paragraph forty-one (41) of the complaint.

32. Paragraph forty-two (42) of the plaintiff's complaint states conclusions of law and need not be answered.

33. Deny the allegations of paragraph forty-three (43) of the complaint.

34. Admit the allegations of paragraph forty-four (44) of the complaint.

35. Paragraph forty-five (45) of the plaintiff's complaint states conclusions of law and need not be answered.

36. Deny the allegations of paragraph forty-six (46) of the complaint.

37. Defendants are without sufficient information to form a belief in the truth of the allegations of paragraph forty-seven (47) of plaintiff's complaint, and therefore deny the same.

WHEREFORE, defendants pray for judgment dismissing the plaintiff's complaint, for costs and disbursements and for whatever further relief the Court deems proper under the circumstances.

Dated this 21st day of August, 1973.

JOHN O. OLSON
United States Attorney

By

WARREN W. WOOD
Assistant United States Attorney

U. S. Attorney's Office
Room #241, Federal Building
P. O. Box 112
Madison, WI 53701

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 228

IN THE UNITED STATES DISTRICT COURT

FOR THE WESTERN DISTRICT OF WISCONSIN

DOCUMENT NUMBER
U.S. DISTRICT COURT WEST. DIST. OF WISCONSIN
JUL 10 1973
JOSEPH W. ... CLERK
CASE NUMBER 73-C-183

STATE OF WISCONSIN, Plaintiff,	)	
v.	)	
HOWARD H. CALLAWAY, Secretary Department of the Army United States of America The Pentagon Washington, D. C. 20301	)	OPINION AND ORDER
CORPS OF ENGINEERS Department of the Army Washington, D. C. 20314	)	73-C-183
LT. GEN. FREDERICK CLARKE Chief of Engineers Department of the Army Washington, D. C. 20314	)	
COLONEL RODNEY E. COX District Engineer Corp of Engineers, St. Paul District 1210 U.S. Post Office and Customs House St. Paul, Minnesota 55101	)	
Defendants.	)	

For the purpose of the plaintiff's motion for a preliminary injunction, filed July 3, 1973, I find as fact those matters set forth hereinafter under the heading "Facts."

FACTS

For some years the defendant Corps of Engineers has engaged in dredging in the Mississippi River to maintain a nine-foot channel for navigation, and has deposited the dredged materials upon lands and in water within the boundaries of the State of Wisconsin, as well as within the boundaries of other states. Such dredging of the river is in progress during the present warmer months of 1973, and it can be anticipated that it will be performed from spring to autumn of 1974 and in succeeding years. Annually, more than

800,000 cubic yards of material is dredged from the channel and deposited elsewhere at costs in excess of $700,000. This annual dredging operation, including the depositing of the dredged materials, affects the environment in the surrounding areas, particularly with respect to the spawning of fish and the living conditions of waterfowl and other forms of wildlife, and also with respect to boating. The specific environmental effects of the deposit of the dredged materials in various locations varies with the specific locations.

With respect to dredging and dumping operations by the Corps of Engineers between river miles 690.4 and 690.7, spoil materials were being deposited by the defendants on a small island just east of the dredging site, which island is within the State of Wisconsin. The said spoil materials were spilling off said island into an adjacent slough. The defendants threatened to continue the said operation immediately unless restrained. The effect of the depositing of said spoils materials, and of the threatened continuation of the depositing, was to harm the fish habitat in the immediately surrounding area, and to impede navigation in nearby sloughs.

The record supports no similar findings with respect to the environmental consequences of the depositing of spoil materials in other specific locations within Wisconsin in which defendants are making deposits or threatening to make deposits.

The record supports no finding that there are immediately available to the defendants alternative means of disposing of the spoils materials dredged from the navigation channel.

There is a considerable economic value to many individuals and groups in the maintenance of a nine-foot channel for navigation in the Mississippi River.

None of the defendants has prepared, with respect to any part of the dredging operation in the Mississippi River, an environmental impact study (EIS) of the kind described in 42 U.S.C. §4332(2)(C). With respect to the dredging operation from Guttenberg, Iowa, to Minneapolis, Minnesota, an environmental impact study is in the course of preparation; it is not expected to be completed until 1974; I am unable to make a finding whether the anticipated environmental impact statement, when completed, will conform to the description of an environmental impact statement in §4332(2)(c).

OPINION

I conclude that the plaintiff has a good chance to prevail in its contention the annual dredging operation of the defendants in the Mississippi River is a "major Federal [action] significantly affecting the quality of the human environment," and that the defendants are required by §4332(2)(c) to prepare and circulate an environmental impact statement before engaging in the action. I conclude that question whether an EIS is required by the statute is to be determined by looking to the dredging project as a whole, with respect to the Mississippi River, and that the necessity for preparing an EIS cannot be escaped by a contention that only a series of non-major segments of dredging operations are being engaged in.

I conclude that the plaintiff has standing to challenge the actions of the defendants, but only to the extent that land and water within the State of Wisconsin is affected.

The question whether an EIS is required is one thing, to be determined by the Mississippi dredging project, taken as a whole. The question whether a preliminary injunction should issue is another, to be determined by the plaintiff's showing of significant, immediate, specific environmental damage which will probably result from threatened deposits of spoil materials at specific sites in Wisconsin. Except as to the operation between river miles 690.4 and 690.7, enjoined by the order entered herein June 22, 1973, plaintiffs have not made the showing with the necessary specificity. The motion for a preliminary injunction filed July 3, 1973, must be denied for this reason.

The immediate question is whether to vacate the injunction entered June 22, 1973.

CORPS OF ENGINEERS

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I [illegible] overall [illegible]tention of the plaintiff [illegible] assumptions, [illegible] will be [illegible] are dangerous. But I have [illegible] injunctive relief, [illegible] if it can, that the defendants [illegible] sites in the State [illegible] damage will probably result [illegible]

[illegible] favor [illegible] ineffective a very large portion [illegible] to forbid the completion [illegible] 653 and 693.7.

ORDER

Accordingly [illegible] record herein:

(1) plaintiff[illegible] for a preliminary injunction [illegible] denied,

(2) [illegible] June 27, 1973, is hereby vacated.

[illegible]

BY THE COURT:

[illegible]

ST. PAUL DISTRICT

CORPS OF ENGINEERS

EXHIBIT 229

IN THE UNITED STATES DISTRICT COURT

FOR THE WESTERN DISTRICT OF WISCONSIN

MAR 6 1974

STATE OF WISCONSIN,
Plaintiff,

v.

HOWARD H. CALLAWAY, Secretary
Department of the Army
United States of America
The Pentagon
Washington, D. C. 20301

CORPS OF ENGINEERS
Department of the Army
Washington, D. C. 20314

LT. GEN. FREDERICK J. CLARKE
Chief of Engineers
Department of the Army
Washington, D. C. 20314

COLONEL RODNEY E. COX
District Engineer
Corps of Engineers, St. Paul District
1210 U.S. Post Office and Customs House
St. Paul, Minnesota 55101,
Defendants,

UPPER MISSISSIPPI WATERWAY ASSOCIATION
700 Midland Bank Building
Minneapolis, Minnesota 55401,
Intervenor.

OPINION and ORDER

73-C-183

This is an action for injunctive relief with respect to dredging activities in that part of the Mississippi River which forms a boundary of the State of Wisconsin. Plaintiff has moved for a preliminary injunction and for partial summary judgment as to the First Claim stated in its complaint. For the purpose of the motion for a preliminary injunction, I find as fact those matters set forth in the following section of this opinion under the heading "Facts," and for the purpose of the motion for partial summary judgment, I find that there is no genuine issue as to the material facts set forth in the following section of this opinion under the heading "Facts."

Facts

As an important aid to navigation in the upper Mississippi River bordering the State of Wisconsin, the defendants have operated and maintained for many years, long prior to January 1, 1970, a system of locks and dams and a nine-foot channel. Unless a channel of nine feet or more in depth and of adequate width is maintained, commercial navigation on the river is seriously impeded, with major consequences to business, industry, agriculture, utilities, and consumers in a large geographical area which is dependent upon the movement of raw materials and finished goods by river vessels, principally barges.

The nine-foot channel has been maintained by the defendants by a dredging program each year. The dredging is to a depth of about ten feet, to insure the nine-foot clearance at all times. Each year, following the peaking of spring high water, surveying of the channel condition is commenced and it is continued thereafter while weather permits. The points at which dredging is required and the quantities of spoil materials dredged from the channel vary from year to year. However, there is a good probability that more than 700,000 tons of spoil material will be dredged from the channel and deposited within the boundaries of the State of Wisconsin in any given calendar year, including 1974. The annual cost of this dredging operation is approximately $700,000, or more.

The spoil material dredged from the channel is deposited on lands and in water near the dredging sites, including the shoreline, islands, and sloughs. The method by which the spoil material is deposited and the locations in which it is deposited have the following effects, among others, each year and cumulatively over the years: the floodway of the river is obstructed; the river is increasingly channelized and there is a reduction in the flow of water into backwater areas; eutrophication of the backwater areas increases and the backwater areas are reduced in size; the flushing effect on the backwater areas during highwater periods is reduced; the overall surface water area is reduced; the appearance of the river area

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is altered; navigation routes into sloughs which have been fishing areas in the past are closed off; the life cycle of many sport and commercial fish species is altered in proximity to wing dams and rip rap, and in proximity to both the channel sides and the shore sides of islands; natural shoreline vegetation which serves as cover and food for many fish species is lost; the diversity of fish habitat is reduced; the increased eutrophication of backwater areas results in increased summer and winter fish kills; and the wildlife and furbearer resting, feeding, and reproduction habitat is degraded.

If the usual pattern of dredging and the depositing of spoil material is engaged in by the defendants in 1974, irreparable harm to the environment will occur; the harm will be as described in the immediately preceding paragraph of this opinion. If no dredging of the channel by the defendants is permitted in 1974, irreparable economic harm will be suffered by many industrial, commercial, and agricultural enterprises, by utilities, by consumers, and others, as well as various forms of harm to individuals and groups by further reduction of energy sources already severely taxed.

A draft environmental impact statement (EIS) with respect to the operation and maintenance of the nine-foot navigation channel in the portion of the Mississippi River in question here has been prepared as of February 25, 1974, and its circulation to interested agencies and groups has commenced.

On October 10, 1972, defendants entered into a contract with North Star Research Institute of Minneapolis for the preparation of "an environmental planning report" with respect to the defendants' maintenance dredging and regulation of the navigation pools on the Mississippi River from Guttenberg, Iowa, to Minneapolis, Minnesota, which includes those spoil material deposit areas within the State of Wisconsin which are in question here. This contract was intended to obtain research necessary to determine the scope of a larger contract with the Institute for the preparation of "an environmental impact assessment report." The latter contract was entered into in January, 1973; the price was $225,000; as of June 22, 1973, it was anticipated that the contract work would be completed by January, 1974.

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ST. PAUL DISTRICT

EXHIBIT 230

Despite the arrangements which had been made with the Institute, the defendants have consistently declined in this lawsuit to acknowledge that their channel dredging operations constitute an action with respect to which existing law requires the preparation, circulation, and filing of an EIS.

Nevertheless, the defendants do not intend to perform any maintenance dredging within the State of Wisconsin during 1974 until an EIS has been filed with the Council on Environmental Quality (CEQ). Unless prevented from doing so, however, defendants intend to do such dredging, prior to filing an EIS with the CEQ, as emergency conditions may necessitate at a particular site. No such emergency conditions were known to the defendants as of October 18, 1973. Nothing in the record suggests that when defendants resume their dredging operation, they will employ methods which differ from those employed by them in the past.

This action was commenced on June 19, 1973. There followed certain proceedings in which the plaintiff sought interlocutory injunctive relief against the placing of spoil materials upon a few specific, limited areas within the state of Wisconsin where defendants were engaged in dredging, or threatened to engage in dredging, at specific times. Limited interlocutory injunctive relief was granted on June 22, 1973, with respect to a specific location; the injunction was vacated on July 10,1973.

OPINION

Plaintiff State enjoys standing to bring this suit because the spoil material is deposited within its boundaries.

The Mississippi River dredging operation performed annually by the defendants, which involves depositing spoil material within the boundaries of the State of Wisconsin, is a "major Federal [action] significantly affecting the quality of the human environment," within the meaning of 42 U.S.C. §4332(2)(c). Defendants are required by §4332(2)(c), and by

§§1500.5 through 1500.11 of CEQ's Guidelines for the Preparation of Environmental Statements, to prepare, circulate, and file an EIS covering this dredging operation before commencing it. Assuming no complications or delays in the course of circulating the EIS, considering the responses, and review by CEQ, and assuming that the defendants' ultimate decision is to proceed with the dredging operation either in the accustomed manner or in some modified manner, the Guidelines would not permit the operation to commence until about June 1, 1974.

However, defendants advance three major contentions: (1) Their channel dredging operation was an ongoing project or program, as of January 1, 1970, when the National Environmental Policy Act became effective, and the application of the Act to such ongoing projects and programs allows for flexibility. (2) Even if the requirements of §4332(2)(c) are directly applicable to defendants' anticipated dredging program in 1974 and thereafter, before injunctive relief is granted, the equities must be balanced, and the equities dictate that injunctive relief be withheld. (3) The basis for injunctive relief is removed by the declaration of defendants' intention to engage, prior to the filing of an EIS with the CEQ, only in dredging at particular sites if emergency conditions arise.

On May 2, 1973, the CEQ published in the Federal Register a proposed revision in its guidelines for the preparation of environmental impact statements, and the revised guidelines as promulgated by CEQ on August 1, 1973, were made applicable to all draft and final impact statements filed with the CEQ after January 28, 1974. 1 Environmental Law Reporter 46003, 46009. Section 1500.13 provides, in part: "The section [4332(2)(c)] procedure shall be applied to further major Federal actions having a significant effect on the environment even though they arise from projects or programs initiated prior to the enactment of the Act on January 1, 1970." It is clear that §4332(2)(c) applies in full force to defendants' 1974 dredging operations. An earlier version of the CEQ guidelines (then number 11)

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had provided that the §4332(2)(c) procedure should be applied to ongoing projects and programs "to the maximum extent practicable." Even under that version if applicable, which it is not, it was entirely practicable for the defendants to comply with the §4332(2)(c) procedure some time after January 1, 197?, and well before spring, 1974. They simply chose not to do so.

When the application of §4332 to defendants' 1974 dredging operation is as clear as I consider it to be, when the CEQ's proposed revision in the guidelines was published as early as May 2, 1973, when this very lawsuit was commenced as early as June 19, 1973, when a limited preliminary injunction as to a small portion of the 1973 operation was entered as early as June 22, 1973, and when irreparable environmental consequences are virtually certain to flow from 1974 dredging, I consider it doubtful whether the court should engage in balancing the equities. I appreciate fully the injury which will befall large numbers of enterprises and people if the river channel depth of nine feet is not maintained. However, in the National Environmental Policy Act (NEPA), Congress imposed upon the defendants and other federal agencies a grave obligation, not to refrain from any major action which might significantly affect the quality of the human environment, but to lay their cards on the table in full public view, and then to proceed only after obtaining and giving serious consideration to the responses from all interested agencies, organizations and individuals. When this grave obligation is not honored, it is all too easy for the offending agency, and those like the intervenor here who will be adversely affected by an injunction, to argue that the court must now engage in a balancing function which is in truth the very function which the defendants were obliged by law to perform, after full public disclosure of the implications of its anticipated project. Nevertheless, assuming that I am called upon to engage in some degree in a balancing of the equities, I consider that the equities lie in favor of appropriate injunctive relief. If this requires defendants to expend additional funds and engage in extraordinary procedures in order to avoid environmental damage while still maintaining navigation, this is a consequence which defendants must accept.

Finally, there must be considered the effect of defendants' answer to plaintiff's interrogatories to the effect that prior to the filing of an EIS with the CEQ,[1] defendants intend to perform no maintenance dredging this year, except for such dredging at particular sites as emergency conditions may require, but that following the filing of the EIS with the CEQ, defendants anticipate that emergency dredging will be required. It is contended that the court may thus concern itself only with whatever the proportions of such emergency dredging may be and only with whatever environmental effect may be produced by such emergency dredging. The suggestion is that such emergency action will not be "major," and that its effect on the quality of the human environment will not be "significant," within the meaning of §4332(2)(c). I imply no skepticism about the representation contained in defendant's answers to interrogatories. But defendants' conception of what emergency conditions may require remains wholly undefined. Also, there is no representation whatever that the method of depositing spoil material will be altered with respect to such emergency dredging as may be done, nor with respect to maintenance dredging when it is resumed. Plaintiffs have made a strong showing that defendants threaten to engage in 1974 in the same practices which they have engaged in for many years. To escape the effect of that showing, I consider that the defendants are obliged to make a far more explicit representation than they have yet made with respect to any dredging operations they may engage in prior to the completion of the procedures required by §4332(2)(c) and the CEQ guidelines. I am affected also by the assumption that the defendants intend to

[1] Defendants' answers to the interrogatories speak in terms of filing the EIS with the CEQ. However, I do not take this literally. I assume the defendants intended to say that maintenance dredging would be withheld until the procedures contemplated by the CEQ guidelines are completed.

honor fully the spirit of §4332(2)(c) and the CEQ guidelines; that they will consider seriously alternative methods described in the draft EIS and suggestions which may be offered by interested agencies, groups, and individuals; and that the decision on the methods to be employed when maintenance dredging is resumed, and the implementation of any changes in those methods, may necessarily require a period of time substantially greater than about 90 days. In that event, emergency dredging may mean something quite different than emergency dredging prior to about June 1, 1974, would mean.

ORDER

Upon the basis of the entire record herein, it is ordered that the plaintiff's motion for summary judgment as to the First Claim of its complaint is granted.

It is further ordered that until the procedures required by 42 U.S.C. §4332(2)(c), and the current Guidelines for Preparation of Environmental Impact Statements promulgated by the Council on Environmental Quality, are fully complied with by the defendants, the defendants are enjoined from depositing any spoil material from the Mississippi River upon lands or within waters lying within the boundaries of the State of Wisconsin; provided, however, that the defendants may apply to this court from time to time for modification of this injunction in emergency situations; provided, further, that any such application for modification is to specify the nature of the emergency situation, to describe the exact location, to describe the specific procedures which the defendants desire to employ in disposing of spoil materials, and to state whether the agreement of the plaintiff to the requested modification has been obtained.

In light of the above order granting the plaintiff's motion for summary judgment, no action on plaintiff's motion for a preliminary injunction appears appropriate. However, I hereby record my intention that should the order granting summary judgment be vacated for any reason, the defendants should be enjoined, in the manner described above, during the pendency of the lawsuit.

Entered this 6th day of March, 1974.

BY THE COURT:

James E. Doyle
District Judge

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 230

IN THE UNITED STATES DISTRICT COURT

FOR THE WESTERN DISTRICT OF WISCONSIN

MAY 7 1974

73-C-183

STATE OF WISCONSIN, Plaintiff, v. HOWARD H. CALLAWAY, Secretary Department of the Army United States of America The Pentagon Washington, D. C. 20301 CORPS OF ENGINEERS Department of the Army Washington, D. C. 20314 LT. GEN. FREDERICK J. CLARKE Chief of Engineers Department of the Army Washington, D. C. 20314 COLONEL RODNEY E. COX District Engineer Corps of Engineers, St. Paul District 1210 U.S. Post Office and Customs House St. Paul, Minnesota 55101, Defendants, UPPER MISSISSIPPI WATERWAY ASSOCIATION 700 Midland Bank Building Minneapolis, Minnesota 55401, Intervenor.	)	AMENDMENT TO ORDER ENTERED MARCH 6, 1974 73-C-183

IT IS HEREBY ORDERED that the Order entered by this Court on March 6, 1974, is amended as follows:

The defendants are permitted to dredge and deposit spoil material within the boundaries of the State of Wisconsin at the following locations:

1. Reads Landing - River Miles 762.5 - 762.9
2. Above Crats Island - River Miles 758.8 - 759.3

If soundings establish that the channel depth is less than 10 feet, the defendants will then be permitted, without further order of the Court, to dredge and deposit spoil material within the boundaries of the State of Wisconsin at the following locations:

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 231 AMENDMENT TO THE ORDER OF THE COURT ENTERED MARCH 6, 1974

3. Grand Encampment - River Miles 756.0 - 757.0

4. Fisher Island - River Miles 745.0 - 746.0

5. Above Winters Landing - River Miles 708.7 - 709.7

6. Winters Landing - River Miles 708.0 - 708.7

7. Above Brownsville - River Miles 690.2 - 691.5

8. Beef Slough - River Miles 753.9

9. Coulter's Island - River Miles 802.5

10. Teepeeota Point - River Miles 757.2 - 757.9

All dredging and spoil deposition within the boundaries of the State of Wisconsin shall be undertaken subject to the following conditions:

(a) Dredging shall be restricted to a depth of 12 feet at locations 1 and 2, and to a depth of 11 feet at locations 3, 4, 5, 6, 7, 8, 9 and 10.

(b) All dredging shall be done by the Dredge Thompson.

(c) All spoil material shall be placed, within the capabilities of the Dredge Thompson, at a location designated by a representative of the Wisconsin Department of Natural Resources. The Court notes that as of May 3, 1974, the Dredge Thompson was capable of depositing spoils within a radius of 1600 feet of its location, but that the defendants were making an intensive effort to obtain equipment which would significantly increase this radius. The Court assumes that these efforts will continue. However, it is not a condition of this Order that such radius will be extended beyond 1600 feet.

(d) The defendants shall provide the Wisconsin Department of Natural Resources with notice of its intention to dredge at the above locations eight (8) days prior to commencing dredging. The said notice shall be accompanied by appropriate charts or maps showing with reasonable specifity, with respect to each of the above-described locations, the places at which the intended dredging will occur. Not less than 24 hours prior to the scheduled commencement of dredging at a particular location, the Wisconsin

CORPS OF ENGINEERS
ST. PAUL DISTRICT

Department of Natural Resources representative shall notify the defendants where the spoil material shall be placed.

In all other respects the Order entered March 6, 1974, remains in full force and effect.

Entered this 7th day of May, 1974.

BY THE COURT:

James E. Doyle

District Judge

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 231

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT. CORPS OF ENGINEERS
1210 U. S POST OFFICE & CUSTOM HOUSE
ST. PAUL. MINNESOTA 55101

IN REPLY REFER TO
NCSED

We are currently preparing a draft environmental impact statement covering the operation and maintenance of the 9-foot channel project on the Mississippi River from Minneapolis to Guttenberg, Iowa, and the affected reaches of the lower St. Croix, Black, and Minnesota Rivers. The draft statement, which is required by Section 102(2)(c) of the National Environmental Policy Act of 1969, is scheduled for completion in February 1974. Upon completion, the availability of copies will be made known and comments will be solicited.

The impact statement will be based largely on a comprehensive environmental assessment prepared for the District by a consultant assisted by a number of investigators associated with various colleges and universities located throughout the study area. To help you visualize the kind of information which will be included in the statement, I have attached a working outline. You will notice that "environment" in this context includes the natural as well as the social and economic setting. In particular, we will be considering alternative ways of operating and maintaining the existing 9-foot channel to optimize beneficial effects and to minimize those effects which are harmful.

If you have comments or background information which you would like to submit at this time, please do so. It is important that your comments be supported with quantitative information, if available. To be of value in the preparation of the draft statement, your comments should reach us by 14 December 1973.

Sincerely yours,

Rodney E. Cox

RODNEY E. COX
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

CORPS OF ENGINEERS

ST. PAUL DISTRICT

COORDINATION LETTER SENT TO VARIOUS AGENCIES AND INTERESTS

EXHIBIT 232

THE STATE HISTORICAL SOCIETY OF WISCONSIN

816 STATE STREET / MADISON, WISCONSIN 53706   JAMES MORTON SMITH, DIRECTOR

The Museum

April 6, 1973

Mr. William L. K. Schwarz
North Star Research and Development Institute
3100 Thirty-eighth Ave. South
Minneapolis, Minn. 55406

Dear Mr. Schwarz:

I am sorry to be so long in replying to your letter of March 22, but I have been away from the office on vacation. Your request for information on historic and prehistoric sites along the Upper Mississippi is a difficult one to handle. We would have to have more information on the reasons for the study that you are making in order to provide information. Also, the time staff would have to spend gathering together data would be extreme.

I have two suggestions to make. Usually all draft environmental impact statements for federal highways, state parks, and Corps of Engineer projects are reviewed here at the Historical Society by all divisions involved. Such draft statements are reviewed by those in charge of Historic involved with the National Historic Preservation Act, archeologists, and members of local historical societies. This routine insures input from all concerned. I therefore suggest that you submit the draft statement to us for review. Three copies should be sent to Dr. James M. Smith, Director, State Historical Society of Wisconsin.

If you wish to have input prior to the draft statement, then I suggest that you send a researcher here to Madison who could talk to staff members about the project and get direct input. This researcher could also check the records of sites that we have and compile the necessary data.

We wish to help in your research. Would you please let me know just how you want to handle the data on prehistoric and historic sites?

Sincerely,

Joan E. Freeman

Dr. Joan E. Freeman
State Archeologist

JEF/cas

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 233

LETTER FROM THE STATE HISTORICAL SOCIETY OF WISCONSIN TO NORTH STAR RESEARCH INSTITUTE

THE UNIVERSITY OF IOWA
IOWA CITY, IOWA 52240

Department of Anthropology

April 24, 1973

Mr. William L. K. Schwarz
North Star Research and Developemtn Institute
3100 Thirty-eighth Avenue South
Minneapolis, Minnesota 55406

Dear Mr. Schwarz:

I am writing in response to your letter to Dr. Marshall McKusick, 22 March, 1973. I am the State Historic Preservation Officer for Iowa, and am deeply interested in environmental impact statements which affect Iowa's architectural and historic places.

There has been no properly intensive study of archaeological or historic sites on Corps property or in Corps activity areas, so we cannot be of much help, but we will be glad to do what we can and will supply what information we have.

I am working with the Corps now to insure that good survey work is done in the future. There will be a meeting in Rock Island on Thursday 26 April to discuss these problems. If you or your representative have an opportunity to visit Iowa City, I would welcome the chance to discuss this in greater detail.

Sincerely,

Adrian D. Anderson

Adrian D. Anderson
State Liaison Officer
State Historic Sites Preservation Program

ADA:mjs

CORPS OF ENGINEERS
ST. PAUL DISTRICT

LETTER FROM THE STATE HISTORIC PRESERVATION OFFICER
OF IOWA TO NORTH STAR RESEARCH INSTITUTE

EXHIBIT 234

CORPS OF ENGINEERS

THE UNIVERSITY OF IOWA
IOWA CITY, IOWA 52242

Department of Anthropology

July 2, 1973

Mr. William L. K. Schwarz
North Star Research and Development Institute
3100 Thirty-eighth Avenue South
Minneapolis, Minnesota 55406

Dear Mr. Schwarz:

Our staff has considered your request for information on sites from Dubuque County north to the Minnesota-Iowa border. You are certainly welcome to come to Iowa City and use our site files. The questions raised by your letter could only be answered by a study of our records followed by a series of intensive and expensive field surveys. We do not see how a realistic evaluation of historical and archaeological sites can be made with existing information, and your U.S. Army Corps of Engineers' summary of large and complex areas should be clearly identified as very tentative at this time.

Sincerely,

Marshall McKusick (M.S.)

Marshall McKusick
State Archaeologist

MM:mjs

cc: Adrian Anderson

ST. PAUL DISTRICT

EXHIBIT 235

LETTER FROM THE STATE ARCHAEOLOGIST OF IOWA TO NORTH STAR RESEARCH INSTITUTE

THE STATE HISTORICAL
SOCIETY OF WISCONSIN

816 STATE STREET / MADISON, WISCONSIN 53706 / JAMES MORTON SMITH, DIRECTOR

Office of the Director

December 11, 1973

Rodney E. Cox
Colonel, Corps of Engineers
District Engineer
St. Paul District
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

RE: NCSED
16 Nov 1973

Dear Colonel Cox:

We have your letter relating to your preparation of an environmental impact statement covering the operation and maintenance of the 9-foot channel project on the Mississippi River from Minneapolis to Guttenberg, Iowa.

The statement outline appears to be very comprehensive but we are interested in the "Detailed description of maintenance and dredging and spoil placement," under "Description of Activity."

We have heard reports from Prairie du Chien that a plan is under study for deposit of the spoil at and near that city on the southern half of St. Feriole Island, with the northern half, approximately, to be developed as an open-space and historical preservation area.

The State Historical Society owns the historical complex on St. Feriole Island including three of the four buildings that have long been recognized as National Historic Landmarks. As we understand the proposal for deposit of the dredge spoil, we believe it would have an adverse effect upon these Landmarks, and would therefore come under the protective provisions of Sec. 106, of the National Historic Preservation Act of 1966 (PL 89-665). The procedures with respect to Sec. 106 in the Federal Register, Nov. 5, 1973, and I call your attention to Appendix B, Criteria for Adverse Effect, items (b) and (c).

The Water Resources Development Act which passed the House of Representatives October 15, 1973, provides for total evacuation of the island and future land use for recreational and historical preservation use. If the Senate concurs, we hope this will permit implementation of the plan which the Corps has been working on since 1969.

Sincerely,

J. M. Smith

James Morton Smith

JMS:dk
cc: Mr. Raymond S. Siveiind,
Mr. Robert Garvey, President's Advisory Council on Hist. Preservation

CORPS OF ENGINEERS
ST. PAUL DISTRICT

LETTER FROM THE STATE HISTORICAL SOCIETY
OF WISCONSIN TO DISTRICT ENGINEER

EXHIBIT 236

LETTERS OF COMMENT

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
1 NORTH WACKER DRIVE
CHICAGO, ILLINOIS 60606

MAY 24 1974

Colonel Rodney E. Cox
District Engineer
U.S. Army Corps of Engineers, St. Paul
1210 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

We have completed our review of the Draft Environmental Impact Statement (EIS) for the Operation and Maintenance (O&M) of the 9-foot Channel in the Upper Mississippi River in the St. Paul District as requested in your letter of February 21, 1974.

We have classified our attached comments as Category ER-2. Specifically, this means that we have environmental reservations regarding this project and we believe additional information is required in the EIS to fully assess the environmental impacts of the proposed project. Our environmental concerns include wetland encroachment, water quality impacts of disposal practices, dredging and disposal in sloughs, the need for greater flexibility in the dredged disposal program, and retention of spoil in the floodway sector of the floodplain. For this Draft EIS, we are not submitting detailed comments on the proposed O&M alternative measures and plans for each of the ten pools. We believe that it is more appropriate to comment on the general aspects and compatibility of O&M activities and reserve judgement on the actual detailed measures and plans prepared for each pool until additional information is made available to our office. In our attached comments, we have indicated EPA's general recommendations regarding dredging and disposal in the Upper Mississippi River.

As in the current practice, I assume that we will be informed in advance of and invited to participate in applicable public, State and Federal meetings on dredging and disposal practices. As dredging is required for specific pool areas, selected and alternative disposal sites are determined, and measures of implementation are proposed, our decision on the disposal sites along with recommended courses of action will be given in accordance with the provisions of PL 92-500.

The classification and date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act.

MAY 24 1974

We appreciate the opportunity to review this Draft EIS and the courtesy extended to my staff on their March 21, 1974 field trip. Please send us 5 copies of the Final EIS when it is filed with the Council on Environmental Quality. Should you have any questions regarding our comments, please contact me or Mr. Gary A. Williams of my staff at your convenience.

Sincerely yours,

Francis T. Mayo

Francis T. Mayo
Regional Administrator

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 237

EPA COMMENTS ON DRAFT EIS FOR O&M OF THE 9-FOOT CHANNEL IN THE UPPER MISSISSIPPI RIVER

GENERAL

Our primary concern over dredging activities as described in the EIS involves the placement and containment of dredged spoil and the potential effects of this spoil upon the aquatic and terrestrial environment. Past and current practices have had a deleterious impact upon the aquatic and terrestrial environment along the Mississippi River and many of these practices could be corrected with acceptable alternative measures. The Congressional authorization for the 9-foot channel project allows sufficient flexibility to satisfy environmental concerns and therefore environmentally sound alternatives should be implemented. With the implementation of NEPA, the importance of encouraging environmental harmony in the Upper Mississippi River is not only further emphasized but required.

It is evident from the EIS that there are many areas of uncertainty relative to project effects upon the river. Some occurrences are dismissed as "natural conditions" when in fact dredging operations may have an equal or even greater impact. Studies aimed at understanding the dynamics of the river segment involved would be beneficial in determining solutions to current problems. It is plainly evident that dredging operations as now practiced, certainly aggravate if not initiate many environmental problems. One significant area requiring further investigation is the relationship of dredging activities to backwater areas and sloughs, and the inherent fishery, wildlife and recreational opportunities that they offer.

In light of the time restraints on current dredging activity and the provision in your regulations to update or revise a Draft EIS when necessary, it is inappropriate to require that the following detailed studies be included in this EIS. However, we would expect that such studies would be completed in the near future and the EIS updated to reflect the results of such studies. The information gained should improve future O&M activities to substantially reduce adverse environmental effects from O&M activities in the Upper Mississippi River. Such studies include: a comprehensive bottom sediment analysis on the Upper Mississippi River; the short and long range effects of O&M activities upon water quality in the river and its tributaries; a complete description of the wetlands, backwater areas, and bottomland forests to be impacted by O&M activities including quantity, quality, relative importance and ecosensitivity of these areas in each pool; the general environmental effects of dredging sloughs and backwater areas; the dynamics of sediment movement induced by dredging and disposal activities; and the effects upon the existing Upper Mississippi River floodplain ecosystem from disposal of dredged spoil within the lower limits of the floodplain. Long-term effects should take into consideration not only the consequences upon floodplain and lowland uses, wetlands, bottomland forests, sloughs, and backwater areas, but also the constriction of the existing meandering waterway, development of a uniform navigation channel, sedimentation and deposition in each pool and associated implications on flood levels.

It is noted that several wetland areas will be affected by the project. Our Wetland's Policy states that wetlands must be protected from adverse dredging and filling practices. Therefore, extreme care must be taken during O&M activities to avoid and minimize any adverse impact upon wetlands. Your new policy regarding the safeguard of wetlands as described in the April 3, 1974 Federal Register is highly desirable and consistent with our own views. With responsive and expedient implementation, such policy will substantially discourage the unnecessary alteration and destruction of wetlands considered to be environmentally vital to the riverine flowage. Although this policy is directed primarily toward the evaluation of permit applications, we fully realize the inherent responsibility to follow your own policy and our guidance as well as other agencies in wetland preservation.

ENVIRONMENTAL SETTING

An adequate description of the dredged spoil is required for major areas of dredging as soon as practicable. A sediment analysis and characterization would insure compliance with our acceptability criteria for spoil disposal, facilitate prudent selection of spoil sites and also serve as a basis for determining the compatibility and usefulness of spoil.

ENVIRONMENTAL IMPACT

The EIS should address the effects of St. Paul District's O&M activities upon the pools in the Rock Island District. The interface between the two districts and the impacts of operational procedures upon water quality and aquatic life should be thoroughly described in the EIS. The reasons for different operational procedures between the two districts to control storm or flood flows should be detailed and explained.

The data in Exhibit 187 regarding Impact on Water Quality demonstrates some unusual occurrences which require clarification. Although the turbidity value for one week after dredging is explained as being in error, there is a significant increase in conductivity which might support the elevated turbidity value. Could the increase in these two parameters be caused by runoff from the disposal site and/or re-entry of sediments into the river?

The data in the same exhibit also indicates that phosphate levels decreased during dredging. This seems highly improbable, especially in view of the nitrogen increase and the dissolved oxygen decrease.

Was the reading, taken four days prior to dredging, a valid value? The persistence of the low dissolved oxygen value after dredging should be explained. Lower values for dissolved oxygen, and higher values for nitrates, conductivity and turbidity could be due to a sloughing effect from the spoil area. Existing programs for pumping spoil to disposal sites and returning the overflow to the river usually cause adverse local water quality impacts. These impacts can be mitigated with partial treatment of the returning overflow, i.e., dikes, successive ponding, and retention basins. Selective monitoring for changes in water quality in areas of spoil disposal should be initiated whenever maintenance activities have the potential to adversely affect water quality in locally important recreational areas, ecosensitive wetlands, such as spawning grounds or waterfowl habitats, and water intakes for private, municipal, industrial or Federal use. If State water quality standards are violated, the implementation of appropriate pollution abatement measures will be required in accordance with the provisions of Section 313 of PL 92-500 and Executive Order 11752.

ALTERNATIVES

The alternatives of increased spoil disposal flexibility, revegetation of disposal sites, commercial use of dredged spoil, watershed land treatment and development of recreational facilities have great potential in reducing adverse social, environmental and economic impacts. These alternatives should receive full consideration in the *decision-making* process and should be incorporated whenever possible in maintenance dredging practices to alleviate adverse impact. These alternatives should be considered singly and in combination in future studies to determine their maximum environmental and economic public benefit.

The implementation of a more flexible disposal program should incorporate the varibility and compatibility of several different plans, i.e. selective spoil placement, remote disposal, central disposal and floodplain removal, for a given pool area. The overall acceptance of such a program will be dependent upon its ability to avoid and minimize the inherent adverse impacts of dredging and disposal practices.

Revegetation of dredged spoils appears to be a viable alternative. It is recommended that future detailed studies be undertaken to determine the feasibility of this alternative. A major environmental problem as stated in the EIS is the movement of dredged spoils by erosion. This alternative has great potential for partially correcting this problem in an effective way, both environmentally and economically.

Watershed land treatment should be considered in areas such as the Chippewa River where there is a substantial conveyance of sediment loads to the Mississippi River (see Exhibit 63). Attacking some of the causes of the sedimentation problem instead of its effects could substantially reduce dredging impacts. As stated in the Minnesota Environmental Policy Act, Section 9, "proper land-use practices can conserve soil resources, provide for flood prevention, expand wildlife resources, prevent impairment of dams and reservoirs, assist in maintaining navigation, protect the tax base and provide areas for recreational development."

Regardless of where the spoil is deposited, it is generally acknowledged that much of the material re-enters the dynamic river system. The EIS also indicates that the erosion of dredged material from unstable spoil areas is resulting in the deposition of sediment in sloughs and backwater areas. Therefore, it seems quite probable that dredged spoil is a primary contributor to the deposition in these areas. If, as is stated in the EIS that more studies are needed in order to understand the dynamics of sediment movement, assurances should be provided that such studies will be undertaken before and during significant local O&M activities in areas of high ecosensitivity. Furthermore, the control of the Mississippi River with locks and dams to provide navigation and flood control has reduced the ability of the river to sustain slough and backwater areas. Consequently, the slough and backwater areas which remain become even more valuable to the floodplain ecosystem.

The EIS contains a section on the "Uses of Dredged Material" which presents the beneficial uses of the spoil to neutralize and offset the detrimental impacts of dredging and disposal. The uses of the spoil are divided into three general categories: commercial, recreational and wildlife habitat. The commercial use of dredging spoils would provide both a direct economic benefit and eliminate some of the adverse environmental effects of the current operation. The cost of delivering dredged spoil to an individual community or company should be compared with the cost of alternative methods of spoil disposal (revegetation, sediment deposition control structures, etc.). At present, some spoil areas receive intense recreational use because of their good accessibility and limited number in a given area. This intense use of available sandy-shoal spoil areas has caused somewhat of a problem in terms of sanitary and solid waste practices. The development of a comprehensive waste disposal program for spoil areas used heavily by recreationists could control both sanitary and solid waste problems and minimize the occurrence of potential health hazards.

Water quality as well as the aesthetics of some pools in the Upper Mississippi River would seemingly have a bearing on the demand for sandy beaches. Where water quality of the river is poor and not suitable or safe for full-body contact, the development of beaches for recreation should be discouraged. The potential health risks of providing beach areas which might induce water-related recreation, i.e., swimming, skiing, etc., where the river is not in compliance with applicable water quality standards should be avoided.

Attributing a beneficial use of dredged spoil to provide wildlife habitat may not be valid or reconcilable on a short-term basis. Furthermore, this practice does not take into consideration the loss of one type of habitat for another. The EIS indicated that, in many cases, natural revegetation of spoil areas has not occurred because of repeated deposits of spoil. Also, where woodlands have been subjected to disposal but not with sufficient frequency to cause mortality, the trees have been stunted and the understory has been lost. Usually diverse aquatic or terrestrial habitats are converted into sterile sand-shoals and piles, providing a poor substrate for primary succession. Only after many years does the flora diversify enough to support a variety of different fauna. Only diverse growth can ensure biologically productive land.

RECOMMENDATIONS ON O&M ACTIVITIES IN THE UPPER MISSISSIPPI RIVER

In conclusion, we believe the following general approach should be used in dealing with water resources impacts of O&M activities. This approach will designate EPA's general recommendations regarding dredging and spoil disposal in the Upper Mississippi River.

1. The need for greater flexibility in the handling and disposal of dredged spoil is required because of the adverse impacts upon environmentally sensitive areas. Additional expenditures for longer pipelines, booster and pump-out equipment and transport barges may be necessary to increase the flexibility of O&M activities.

2. The practice of retaining spoil in and adjacent to the waterway should be modified. The adverse effects of the existing program upon water resources and wetlands are apparent. Deposition in the upper reaches of the pools and along the wing dam sectors is obvious from comparative photograph displays in the environmental assessments. Where feasible, we believe spoil should be moved as far away from the river as practicable to prevent its redeposition in the river. This approach will not be necessary in every case, but where shoaling is intense and dredging requirements are extensive, it should be encouraged. Furthermore, if sensitive wetlands or bottomland forests exist in the vicinity, spoil should also be removed to a more compatible area, preferably outside the floodway. Placement in fringes of the floodplain would probably be acceptable.

3. The existing program of selecting spoil disposal sites is in need of modification. Regardless of the fact that infrequent spoilage in some areas has created a few diversified ecosystems, the usual results are sterile sand-shoals that adversely impact, either directly or indirectly through sedimentation and redeposition, environmentally sensitive areas such as spawning and fishing grounds, waterfowl habitat, and other wetland or bottomland habitats. With care and coordinated agency planning, adverse impacts can be avoided.

4. The load capacity of a given area to successfully retain spoil deposits and support a viable ecosystem is an important factor that has been overlooked in the past and should be given careful study in the future. When selecting sites for disposal, consideration should be given to the frequency of spoil disposal, quality and quantity of spoil, and the type of area affected.

5. Bottom sediments of each pool should be periodically monitored (3 year intervals) to determine their quality and character for a compatible program of disposal with local ecosystems. Bottom sediments that are found to be polluted must be confined in a disposal facility.

6. Pollution abatement measures for minimizing adverse water quality and environmental impacts at selected disposal areas should be planned prior to dredging. Where necessary, pollution control structures should be constructed and completed prior to the disposal of spoil. Stabilization of the disposal area is an important measure that should be implemented after spoil deposition. Stabilization measures such as revegetation are necessary to minimize water and wind erosion and redeposition in the river.

7. In order to improve the understanding of O&M activities on the Upper Mississippi River, detailed studies to determine the composition of bottom sediments, short and long-range water quality effects, the nature of sediment movement and effects of spoil placement should be undertaken as soon as practicable.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 237

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
NORTHEASTERN AREA, STATE AND PRIVATE FORESTRY
6816 MARKET STREET, UPPER DARBY, PA 19082
TELEPHONE (215) [redacted] 597-3772

8400
April 5, 1974

Col. Rodney E. Cox, District Engineer
St. Paul District, Corps of Engineers
1210 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

Refer to: NCSED-ER

Dear Col. Cox:

A copy of the Draft Environmental Impact Statement for Operation and Maintenance, 9-Foot Navigational Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa, has been referred to us by our Milwaukee office, since national forest lands are not involved in the scope of the draft as written.

Since receipt of the draft, we believe that we have received a notice that another statement is in preparation to cover a similar project below Guttenberg. As in the case of segments of proposed highways, we assume that the value of the channel above Guttenberg depends upon a decision to proceed with the corresponding project below Guttenberg. If this is the case, it would appear to follow that environmental analysis and decision making should take place concurrently, or as a whole. We realize that agency organizational structure poses problems for such an approach.

Our interest in dredging proposals continues to center in (1) the differences in philosophy between removing that fraction of sediment which results from accelerated erosion after it reaches water, and reducing erosion and sediment production through watershed management and land treatment, and (2) the revegetation of spoil areas.

We are very pleased to see the consideration you have given watershed land treatment as an alternative, and feel that your staff should be complimented. We believe that this is the first dredging proposal which we have reviewed which has incorporated this consideration. We are not in total agreement with the discussion because we feel that it tends to be biased against land treatment as an alternative, just as we no doubt tend to be biased in favor of it. An example of this bias is the statement "However, the cost of implementing some of these measures would be prohibitively high for individual landowners or watershed organizations and may be unjustifiably high when compared to the potential benefits." As you know, such measures now receive public subsidies on the basis that the public benefits, just as dredging is subsidized or financed wholly by the Government.

Similarly, negative statements include "trying to institute more watershed land treatment measures in an emerging area of food shortages --- would probably be difficult," and "savings ... might not balance the expenditure." No basis is presented for these conjectures and we feel that just the opposite is more probably true.

The opening discussion of Sedimentation, under Sediment sources, includes the statement that "Sediment results from natural processes...." It is not until four pages later that one reads: "The present sediment situation in the Upper Mississippi River Basin probably reflects a combination of natural and man-induced influences." Is there really any doubt on the latter statement? The third paragraph which follows that statement sounds more positive.

As we understand it, the status quo plan relies upon natural revegetation of spoil areas. Some investment of effort to speed up the process may be justifiable.

We have not given the draft as thorough a review as it deserves, but appreciate the opportunity.

Sincerely,

Robert McDonald

for ROBERT D. RAISCH
Director

CORPS OF ENGINEERS

ST. PAUL DISTRICT
EXHIBIT 238

UPPER MISSISSIPPI RIVER BASIN COMMISSION

FEDERAL BUILDING, ROOM 510 FORT SNELLING TWIN CITIES MINNESOTA 55111 PHONE 612 725 4690
REG OFFICE ROOM 238 FEDERAL BLDG COURTHOUSE FARGO N D 58102 PHONE 701 237 5771 EXT 5355
OFFICE OF THE CHAIRMAN

April 10, 1974

Colonel Rodney E. Cox
U.S. Army Corps of Engineers
Room 1222 - Post Office and Custom House
180 East Kellogg Boulevard
St. Paul, Minnesota 55101

Dear Colonel Cox:

The attached comments of the U.S. Department of Agriculture were sent to me by the State Conservationist of Iowa.

I have talked with Mr. Bill Brune from the Soil Conservation Service, and he informs me that these views are intended to be the Department's official comments on the Draft Environmental Impact Statement regarding Operating and Maintenance on the Nine-Foot Channel in the St. Paul District of the Corps of Engineers.

Mr. Brune has asked that I forward these comments to you as the Department's official response within the EIS review process.

Sincerely,

George W. Griebenow

George W. Griebenow
Chairman

GWG:dm /Enclosure

CORPS OF ENGINEERS

ST. PAUL DISTRICT
EXHIBIT 239

LETTER OF COMMENT
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
823 Federal Building, Des Moines, Iowa 50309

April 5, 1974

Re: Dredge Spoil Study Committee, UMRBC

Mr. George W. Griebenow, Chairman
Upper Mississippi River Basin Commission
510 Federal Building - Fort Snelling
Twin Cities, Minnesota 55111

Dear George:

My staff has completed a review of the Draft Environmental Impact Statement on the operation and maintenance of the nine foot channel. Review comments were also requested from the Forest Service, Economic Research Service and Soil Conservation Service staffs in Minnesota and Wisconsin.

We are greatly concerned about the erosion of agricultural lands within the Mississippi River drainage and the subsequent effects on the river. Another area of concern is the disposition and treatment of spoil areas subject to erosion. I am looking forward to discussions of these issues during future meetings of the River Basin Commission and the Dredge Spoil Study Committee.

The following are our comments on the draft environmental impact statement:

Page 11 - tainer gates to tainter gates

Page 52 - Driftless Section more conventionally known as Driftless Area

Page 53 - As above

Page 54 - As above

Page 58 - Spelling of Hinkley to Hinckley

Page 59 - As above. Change Pre-Cambrian to one word - Precambrian

CORPS OF ENGINEERS
ST. PAUL DISTRICT
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Page 77 - If study areas are designated as Northern Lake States Forest and Forage Region, etc., the correct terminology is land resource region K, L, M, etc.

Exhibits 1 and 31 - Prairie du Chein should read Prairie du Chien

Exhibit 61 - Lake sills and clays should read silts
The diagram is not well explained.

Exhibit 65 - This exhibit was first published by the Soil Conservation Service many years ago (1956 or before). Credit should be given SCS.

Exhibit 103 - Population data figures should be rounded off to nearest 000

Throughout - very poor documentation. Should have a footnote reference when mentioning investigators. See page 111 for example. Bailey, Uhler, and Stevens. No bibliography. This should be standard for any EIS draft.

Picture credits should be given if other than Corps of Engineers' photographs.

Page 77 - Sediment yields - Since the particular land use which increases erosion and sedimentation much beyond a geologic norm is cropland, it would be most instructive to state the percent of land or acres of cropland in the two land resource regions K and M.

Page 79 - "The bedload carried by streams in the UMRB varies between 0 and 40 percent of the total sediment transported, generally being about 10 percent." - Source of data?

Page 263 - Impacts on topography and geology. It is suggested that this first paragraph be expanded to demonstrate more specifically the sources of sediment.

Page 264 - "Some have indicated that it (sedimentation) is taking place at an alarming rate." State reference: "The impoundments have increased somewhat the rate of accumulation of sand and silt in the flood plain."

Page 342 - Several P.L. 566 watershed projects in Wisconsin have been completed in Buffalo, Pepin, and Pierce Counties. The major project purposes were watershed protection and control of erosion and associated land voiding and depreciation. These projects demonstrate an effective means of reducing erosion at its source. Not only does agriculture benefit from this type of project, there are other benefits to the public related to roads and bridges, as well as social, esthetic, and environmental aspects. Although changes in stream regimen may occur because of a reduced volume of sediment reaching the tributaries to the major rivers and conveyed to the Mississippi, the results of such control should be accounted for in a reduction of dredging costs and preserving the valuable nine-foot navigation channel and associated fish and wildlife. It is suggested that any erosion and sedimentation study should include P.L. 566 watershed projects as a means to control gully erosion and associated sedimentation.

Page 172 - It is suggested the sentences "Even today, the watershed is severely abused by agricultural practices" and "Step slopes, in most areas, are still plowed and grazed", be deleted. They do not add significantly to the already adequate discussion of agricultural land use.

Sincerely,

Wilson T. Moon

Wilson T. Moon
State Conservationist

Attachment

CORPS OF ENGINEERS

ST. PAUL DISTRICT
EXHIBIT 239

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

May 8, 1974

Colonel Rodney E. Cox
District Engineer
St. Paul District, Corps of Engineers
1210 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

The draft environmental impact statement for the proposed "Operation and Maintenance of the 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa," which accompanied your letter of February 21, 1974, has been received by the Department of Commerce for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

General

The draft statement does not adequately discuss the impacts of operation and maintenance on the fishery resources of the river. The statement was difficult to review because of its organization into text and exhibits sections. This format made it difficult and time consuming to correlate text and exhibits.

Specific Comments

Summary

3.a. Environmental Impacts

Page xi. The statement that "The aesthetics of the present river setting and the production of fish and wildlife are dependent upon the continued operation and maintenance of the project" is inaccurate. With particular reference to the productivity of fishery resources, we believe that there is little or no, real dependence on project operation and maintenance for the continued existence of this resource. We suggest, therefore, that the quoted statement be changed or deleted.

1. DESCRIPTION OF MAJOR FEDERAL ACTION

Detailed Description of Maintenance Dredging and Spoil Disposal

Page 13. This section should more fully discuss the over-dredging of a 9-foot navigation channel to 13 feet, especially since this occurs in all reaches of the river. The Federal authority for this additional dredging should also be included.

In addition, in the discussion of the Dredge Thompson, a clear distinction should be made between total costs and costs for use within the St. Paul District. This would allow for a discussion of the primary and/or secondary impacts that the operation and maintenance within the St. Paul Districts have on the Rock Island District.

Maintenance of Water Quality, Water Quality Improvements, Dams Numbers 4-10

Page 35. The statement should address the need for water quality improvement below the Twin Cities at Lock and Dams 2 and 3.

Upper Mississippi River Wildlife and Fish Refuge

Page 47. The statement in this section indicating that the above named refuge became a reality to a large degree as a result of the project is misleading. The refuge system predates the project by six years and is not a result of the project, as implied. In fact, as a result of the project many thousands of acres of refuge lands were inundated by project constructi n. The statement should contain figures indicating acreages under refuges management both before and after the 9-foot project. In addition, the differences in management rights on Corps lands and Refuge lands should be explained in the statement.

2. ENVIRONMENTAL SETTING

Physical Aspects of Study Areas Sedimentation, General

Page 75. Nutrients carried downstream by flood waters play an important role in fish production. This fact is well illustrated by the Aswan Dam situation, where the loss of nutrients to the delta area caused an abrupt decline in sardine catches in the Mediterranean.1/

Aquatic Vegetation, Pools 4 through 10

Page 116. The plant species list in exhibit 83, compiled in 1947, should be updated.

Fish

Page 134. It would be helpful if the statement indicating that the wing dams provide lush feeding grounds for various species of fish species were referenced.

Page 135. In the discussion of migratory fish, the disappearance of the skipjack and blue sucker is correlated with the construction of the Keokuk Dam. This dam was constructed 17 years prior to the 9-foot channel project. We believe a more likely correlation would be the construction of the lock and dam system in the 1930's and the disappearance of the skipjack and blue sucker 20 years ago.

Pages135-136. It is stated that "The commercial fish harvest during post-impoundment times has been mostly greater than prior to the dams. Several species are listed as being important, including carp, buffalo fish, catfish, sheepshead, and suckers. These statements refer only to the quantity of fish taken; the value of the catch should also be mentioned, and these figures might be adjusted to show rising market demand and cost of living.

Aquatic Invertebrate Animals, Miscellaneous Aquatic Invertebrates

Page 143. It should be noted whether the tubificids mentioned are the clean or polluted-water forms; if both are present, the relative abundance of each should be noted.

Freshwater Mussels

Page 144. It would be helpful if the more recent studies on mussels referred to in the text could be included. In addition, exhibit 95 provides a preimpoundment list; however, without a current list, comparison is difficult.

Commercial Fishing and Trapping

Page 178. The limited amount of data presented in this section makes it difficult to examine the conclusions. In actuality, the only information supported by data is the fact that the majority of fish are produced in pools 4,8, 9 and 10. This section should include data on the preproject conditions compared with present production, including data on overall trends in the catch, change in species composition, changes in fish movement or concentration that resulted from project maintenance and the effect of market changes, and improvements in fishing methods and gear.

Socioeconomic Factors Pool by Pool

Page 186-263. The sections in this major sub-section dealing with commercial fishing indicate, in several instances, that the commercial catch has benefited from the 9-foot channel project. Data and documentation should be included to support this contention, including value and production figures.

Impacts on Fish and Wildlife

Page 267. The state on this page referring to "The great commercial catch of fish in the area . . ." as a result of the project neglects to mention the important factors of market demand and improved technology in fish capture and processing.

Barge Transportation and Energy Use

Page 276. The information regarding the relative energy use of railroads and barge traffic presented on page 283 should be introduced and discussed in this section.

Barge Transportation and Air Pollution

Page 277. It would be helpful if a section on Barge Transportation and Water Pollution could be included following this section. This section should discuss barge-related pollution, including barge loading and cleaning.

3. ENVIRONMENTAL IMPACT OF OPERATION AND MAINTENANCE

Impacts of Dredging on Water Quality

Pages 301-304. Additional information on the dredge spoil study at Crosby Slough and Island should be included in this section. This information should include, but not be limited to, methods and equipment used to collect samples, methods used in analysis of samples, number of samples taken at each station, location of stations, and dates and times of sampling. The question of whether climatic conditions such as wind and rain were similar prior to each sampling date should be addressed.

Impacts on Land Use--Channel Maintenance

Page 305-307. The use of 1940 maps to determine the habitats before disposal is inappropriate and fails to consider the approximately 25 million cubic yards of dredging spoil deposited prior to 1940 (exhibit 76). This spoil volume is about one-third of the total spoil removed from the project to date. Secondly, the use of 1973 aerial photographs to identify present acreages of spoil fails to consider the erosion of some spoil areas, as well as the slight revegetation of others. Thus, the actual areas affected by spoil deposition are probably not adequately represented in the 1973 aerial photographs.

Impacts on Aquatic Vegetation Animal Life--Channel Maintenance

Page 316. Data on the actual amounts of cutterhead turbidity should be included to support the statement claiming such turbidity to be insignificant.

Page 321. The statement in the last paragraph on this page indicating that Gibbs Slough filled with sand, even though it had never been used as a disposal site, tends to create an erroneous impression. The slough, in fact, could well have been significantly affected by the project in any or all of the following ways: (1) the pool created by the lock and dam could have changed the sedimentation pattern and carrying capacity of the river; (2) spoil deposited in other areas could have been redistributed to Gibbs Slough; and (3) dredging of the navigation channel could have had an effect on current pattern and siltation, along with the pool creation mentioned above.

Alternative Measures. Watershed Land Treatment

Page 344. The statement indicates here that the adoption of any "watershed land treatment measures in headwater areas would probably have little or no effect on /the amount/ of dredging . . ." necessary for maintenance. On page 94, however, one of the reasons listed for the decline in dredging trends in the St. Paul District is the "Bank stabilization and land treatment measures instituted particularly within the last 40 years . . . . ." It appears that the conflicting views presented in these two sections should be resolved.

Remove from Floodplain

Page 383. The information presented in this section is conflicting and often confusing. It appears that the dredging and handling costs, as indicated by the statement, are considerably higher than those incurred by private sand and gravel companies. These companies, while operating under similar conditions, remove millions of cubic yards of sand and gravel from the river to storage areas at costs ranging from $0.75 to $2.00 per cubic yard.[2] It appears that these figures are significantly lower than the $1.97 to $6.35 per cubic yard quoted as the cost in the statement.[3] In addition, this section should include sufficient information on the cost and number of additional transportation facilities necessary for spoil removal to justify the conclusions reached.

Dredge Operations. Size of Dredge Cut

This section should discuss the possibility of using passing lanes in selected locations, which would reduce the need for maintaining the entire project at the present width. In addition, since barges stop and start at a relatively few areas, the possibility of reducing the 13-foot depth of over-dredging in given areas should also be considered and discussed.

Dredge Openings into Backwater Areas

Page 403. Many natural openings into backwater areas are less than the 125 feet listed for the "narrow" entrance to Murphy's Cut; these smaller openings are also important to the well being of fishery resources in the backwater habitats.

Increased Dredge Plant Capability

Pages 411-414. The cost figures presented for the various alternatives should be coordinated with those prepared by the Rock Island District, Corps of Engineers, which are significantly lower.

Uses of Dredged Material. Commercial

Page 445. Item "h" on this page indicates that the private dredge contractors and sand gravel companies might be adversely affected by any change in market conditions that may occur if this dredged material were available for sale. Since these contractors regularly dredge sand and gravel for commercial purposes, the apparently mutually beneficial option of these contractors performing their dredging in the areas requiring maintenance should be explored and discussed.

Alternative Plans

Pages 457-576. The cost figures presented throughout this section should be broken down into components and explained. In addition, the cost of purchasing new equipment should be listed only once because, after purchase, this equipment can be used in each pool.

6. THE RELATIONS BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Page 576-580. It should be noted that the fish and wildlife values referred to in this section were also produced prior to the project and likely would have continued without its construction.

Thank you for giving us an opportunity to provide these comments which we hope will be of assistance to you.

Sincerely,

Sidney R. Galler

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 240

Literature Cited

1. Aleem, A.A. 1969. Marine fisheries resources of the United Arab Republic. Food and Agriculture Organization of the United Nations, General Fisheries Council for the Mediterranean, Studies and Reviews, No. 43, 22 pages.

2. Upper Mississippi River Dredge Spoil Survey. Minnesota Area Office of Ecological Services, Bureau of Sport Fisheries and Wildlife, March 27, 1973. 9 pages and appendix.

3. Unit cost per cubic yard minus unit cost of $2.25 to remove material from stockpile a distance of about 25 miles (Exhibit 195, pages 218 and 220.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
300 SOUTH WACKER DRIVE, CHICAGO, ILLINOIS 60606

April 18, 1974

REGION V

IN REPLY REFER TO:
5M

Colonel Rodney E. Cox
District Engineer
Corps of Engineers
St. Paul District
Department of the Army
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

This is in reference to your communication of February 21, 1974 with respect to the prepared draft of the Environmental Impact Statement for the Operation and Maintenance of the 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa.

The draft statement, as it must, brings into view the issues and alternatives that must be faced. It points the directions for remedy and should serve as a basis for developing and adopting a long-term plan and program of dredge material disposal which will be less detrimental to the "ecosystem" of the River.

Sincerely,

Dean Swartzel
Assistant Regional Administrator
for Community Planning & Management
and
Environmental Clearance Officer

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 241

LETTER OF COMMENT
U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER-74/304

MAY 6 1974

Dear Colonel Cox:

Reference is made to your February 21, 1974, letter requesting the Department of the Interior's comments concerning the draft environmental statement for the Operation and Maintenance of the Nine-Foot Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa.

These comments are submitted in accordance with the provisions of the National Environmental Policy Act of 1969, Public Law 91-190.

We find the draft statement to be very inadequate in its assessment of what environmental effects the project will have on fish, wildlife, recreational and historical resources. Many portions of the draft need strengthening. We would suggest that since project environmental effects are obviously not restricted to just the section of the river within the St. Paul District and since environmental "benefits and costs" alike overlap into other jurisdictional reaches, that the final impact statement address the entire project reach. Advisedly, the final statement should discuss the entire Upper Mississippi River "nine-foot project" and minimally should address the project reach from the mouth of the Missouri River to the head of navigation. To avoid confusion, the "nine-foot project" authorization dates should be used as a baseline date for measuring associated impacts.

Our Department has a Congressional mandate to protect this Nation's natural resources. We have been given a special obligation to manage the Upper Mississippi River Wildlife and Fish Refuge. It is now abundantly clear, as supported by information confirmed within the draft statement, that the current "status quo" method (least cost) of channel maintenance is doing significant damage to our natural resources and will continue to do damage at an ever accellerating rate if continued. The short-term advantages of proximal disposal

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LETTER OF COMMENT
U.S. DEPARTMENT OF THE INTERIOR

are far outweighed by long-term disadvantages and environmental costs. We are left with no alternative but to oppose continuation of the present means of spoil disposal in light of our Congressional obligations.

We have long enjoyed a close-working relationship with the Corps of Engineers and would hope that we can continue this relationship. It appears obvious that in the future we will need to develop rather intense resource development plans, on a pool-by-pool basis, for the entire upper river and especially in regard to channel maintenance procedures. Some or all of the possible disposal alternatives presented in the draft statement will have to be actively developed. Specifically, certain areas may require dedication as spoil containment areas so that the dredge spoil sands will not shift into valuable resource areas or so that the material may be stockpiled for better uses. In some areas it may be necessary to completely remove material from the floodway or perhaps utilize the material in other areas where recreational facilities are desired. River hydraulics will require future study and sources of bedload sediments will need identification. In areas of high source material, such as apparently occurs on the lower Chippewa River, joint plans should be developed to intercept bedload material or, better still, control erosion at the source. Obviously, the constraint of selection of spoil sites by present plant capacity must be removed. The increasing of current disposal capabilities through acquisition of additional plant, the modification of current equipment, or if necessary, through contract dredging is immediately necessary. We feel that whether backwater closures are directly or indirectly due to channel maintenance or natural causes, the ongoing maintenance project should actively assist in restoring circulation to backwater areas. In this regard, we are willing to help identify and develop study plans to restore these areas. Our Department is willing to actively support your efforts in obtaining funding to incorporate these various features into project maintenance.

In summation, we believe that the draft environmental statement is in need of major reworking. Attached hereto is our analysis of the subject draft statement with specific recommendations on how to strengthen the final document.

Sincerely yours,

Deputy Under Secretary of the Interior

Colonel Rodney E. Cox
District Engineer
Department of the Army
Corps of Engineers
St. Paul, Minnesota 55111

Attachment

CORPS OF ENGINEERS

ST. PAUL DISTRICT
EXHIBIT 242

U.S. Department of the Interior's
comments on the
U.S. Army's Corps of Engineers'
draft environmental statement
for
Operation and Maintenance of the Nine-Foot Channel,
Upper Mississippi River,
Head of Navigation to Guttenberg, Iowa

On the basis of our review of the statement, in areas of our jurisdiction and expertise, we believe that the following comments should be addressed in the final statement.

We find the statement to be inadequate and misleading as it responds to the five major questions posed in the Environmental Policy Act of 1969. We take this position in respect to the following issues.

1. The statement addresses only one segment of the Mississippi River rather than the entire length affected by the actions of "operation and maintenance."

Actually, the authorized "operation and maintenance" (O&M) program for the Mississippi River Nine-Foot Channel includes the entire river reach between St. Paul, Minnesota, and Cairo, Illinois, a distance of 857.6 river miles. Three Districts of the Corps of Engineers (St. Paul, Rock Island, and St. Louis) are responsible for this action. Yet, patterns of water level fluctuation and fluvial hydraulics are matters which are interdependent of the three responsible administrative Districts. Even the many biological and geophysical involvements generated by the project and by O&M itself suggest that this latter action should be treated singularly rather than in parts. Certainly, changes in plant composition and succession, waterfowl movements, and the migratory requirements of several species of fish (including their utilization) recognize no district boundaries of the Corps of Engineers. We suggest that an overview statement be developed to consider the total impacts of O&M from the head of navigation to mile zero at Cairo, Illinois. We understand that 14 or more separate statements eventually will be developed to cover the one program of O&M for the Upper Mississippi River. Such a voluminous undertaking would not seem necessary if the primary issue of O&M was dealt with decisively, and not confused with repetitious reference to the effects of initial project inundation of the original floodplain ecosystem (slack water vs. live stream).

2. The statement does not explore all reasonable alternatives to past and current methods of "operation and maintenance" and those identified are not fully discussed in respect to their impact on environmental values.

Foremost of those alternatives worthy of extensive consideration be an analysis of other means of transportation. Some minor references are made to comparative energy uses of the various modes of transportation, but they are not treated as alternatives to the present method of O&M. Even the alternative for dredge spoil removal by private dredgers or by sand and gravel companies was not analyzed fully.

Present regulations or rules in locking procedures should be more fully described. Changes in regulations on locking of commercial and recreational traffic may also be a viable alternative. Changes in priorities for use of the locks, expecially during holidays, should be explored as well as the need for stronger regulations on loading and cleaning of barges. Also, regulations to prevent accidents by overloaded barges or under-powered push boats cannot be dismissed even though such rules are not necessarily the responsibility of the Corps of Engineers.

Unquestionably, there are other alternatives to the present O&M program that are worthy of being considered in the statement. New barge design, contract dredging, better regulation of reservoir storage to combat low flows, possible changes in structure design, and change in location of structures are other possible alternatives. These are broad concepts that should demand intensive study. Unfortunately, one gains the impression from reading the statement that a predecision was made to justify and defend the "status quo." If such is true, this decision undoubtedly hampered constructive and imaginative thought of those personnel responsible for preparation of the impact statement.

3. The statement goes to great length to justify continued "operation and maintenance" as now accomplished. In other words, the "status quo" as mentioned under point 2, concept is presented instead of evaluating environmental, social, and economics of such actions.

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Emphasis is placed on benefits that either do not exist or have little if anything to do with O&M. More often than not, these benefits are the result of initial project implementation and have no direct bearing on the current O&M program.

For example, the Summary, page xi, states that aesthetics and production of fish and wildlife depend on continued operation and maintenance. High quality aesthetics, as well as fish and wildlife, are not dependent on dredging or other maintenance activities for their continued existence.

Stressing recreational use of dredge spoil piles throughout the report is misleading. Only a small percentage of the spoil is used for recreational activities. Certainly, the inference that the invention of water skiing had something to do with the project is not correct and not relevant to this EIS.

Adverse environmental impacts are either largely ignored and often oversimplified or they are determined not to be related to O&M. We agree that the barge transportation industry is one of the primary beneficiaries of O&M. Yet, the section on Unavoidable Adverse Impacts of Operation and Maintenance (page 333) notes only one of the many unavoidable impacts; and in this instance, the reference to the increased possibility of spills actually is not considered as an impact of O&M. Barge accidents, spills, interruption of recreational traffic, increased turbidity, increased air pollution, and increased water pollution are serious primary and secondary adverse impacts caused by the presence of deep draft traffic that cannot be dismissed and should be throughly discussed.

The Summary of Major Beneficial and Adverse Impacts of the 9-Foot Channel Project, page 263, again implies that there are only beneficial impacts from the project; yet, the detailed section under that heading discusses some adverse impacts. For that matter, other summary sections throughout the statement show bias in presenting beneficial impacts but adverse impacts are often ignored or not addressed fully. Since the summaries are misleading, it becomes almost impossible to evaluate project impacts - beneficial or adverse. Unfortunately, this false note will be subscribed to by the average reader who will have a tendence to review only the summaries because of the voluminous nature of the statement.

We suggest the subsection entitled Public Health and Safety under Environmental Impact of Operation and Maintenance be rewritten to identify the direct safety hazard to people utilizing the beaches next to deep, fast water. Unstable and unpredictable bottom conditions exist at the edges of new spoil deposits and also in the shoaling areas downstream. Drownings have occurred in such areas in other districts. Additional danger exists where spoiling is done near the locks and dams. Swift and unusual currents exist in these areas which would be hazardous even to good swimmers. The situation at Lock and Dam No. 7 is a good example of this danger. At the head of Lake Pepin, a swimmer or wader along a spoil beach might suddenly find himself a mile or more from shore. Dangers to swimmers and recreational boaters at new and naturally eroded spoil sites should be incorporated into the final statement.

Inflated statistics and use of data not applicable to the Mississippi River distort the facts within the statement. The addition of $2.25 per cubic yard for removing the spoil from the floodplain does not appear appropriate. This figure is the cost of moving the material from stockpiles after it has been removed from the river. This is not a cost that the Corps of Engineers would assume and cannot be applied to cost estimates for their dredging activities (Exhibits 195 through 208 - Footnote 6). If the Corps plans to truck every cubic yard of spoil 25 miles, this should be discussed. Apparently, $ .55 per cubic yard also is added to the cost, supposedly since it will cost the Rock Island Corps of Engineers District more to dredge (page 412). No data are presented to substantiate the $ .55 figure or the addition of it to the costs of the St. Paul District's dredging. This further supports our recommendation to develop a single statement for the entire authorized project from St. Paul, Minnesota, to Cairo, Illinois.

A serious question also arises on the validity of calculating sedimentation rates when using Exhibit 65. The statement indicates that the results should be considered approximate.

Yet, these approximations are used to prepared Exhibit 66 and are used to calculate in a most definite manner the percent of the bedload that is dredged. Moreover, Exhibit 65 is based on the operation of large, deep reservoirs that have little similarity to the navigation pools. If the navigation pools did fall within the range of the curve on Exhibit 65, they would be at the lower left corner where the accuracy is highly questionable. This is pointed out in Note 3 on Exhibit 66, but such inaccuracy holds true for all of the pools, not just Pools 1 and 5A. Since much of the statement is based on the exhibits, more reliable data should be used and a better explanation of the use of the data is required.

In the evaluation of changes in each pool, a disparity in the analysis has been introduced. Increases in commercial lockage for each pool are indicated in percentages while changes in numbers of recreation lockages are given as actual numbers. This gives the impression that of commercial traffic is increasing rapidly while recreational traffic is increasing at a much slower rate. However, by using the limited data provided, recreational usage can be shown to have a higher percent increase. To avoid confusion and question on counting procedures, actual numbers of both tows and recreational craft should be given rather than the number of lockages.

When more data are made available, as in Exhibits 162 and 164, the longer term trends show up dramatically. Both commercial and recreational uses fluctuate, but over the 19 years of data provided,the changes favor recreational use. The following comparison of percent changes in lock use is taken from the statement and from computations using Exhibits 162 and 164.

Lock and Dam No. 8--Percent Increase in Use

	1960--1972	1954--1972
Commercial	28%	4%
Recreational	37%	3,794%

Lock and Dam No. 9--Percent Increase in Use

	1960--1972	1954--1972
Commercial	45%	59%
Recreational	5%	797%

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ST. PAUL DISTRICT

EXHIBIT 242

A 3,794 percent increase in recreational use on Pool 8 or 797 percent on Pool 9 is obviously not a valid indication of use or trends of use. However, these figures are calculated exactly as those given throughout the section for commercial traffic use, except that the base year is 1954 rather than 1960.

A better analysis of the comparative available data is required before the true setting can be known. The statement uses part of the available data in a manner that confuses the reader and justifies the continuance of the O&M purely for the sake of commerce.

4. The statement does not provide a base upon which a comparative analysis of impacts can be made.

In order to determine the environmental impacts that have been made, and will continue to be made, a base must first be established for valid comparison of the impacts. This has not been done. As the impacts are discussed throughout the statement, there seldom is any attempt to determine how these impacts were established or to provide comparative basepoints.

For instance, in the section Major Beneficial and Adverse Impacts of the 9-Foot Channel Project, Subsection Fish and Wildlife, the increased space for aquatic vegetation and animal life is referenced. There is no basis for this generalization. The statement should indicate the years being compared and describe the changes in acreages of aquatic and terrestrial habitat. Finally, this section should describe actual economic, social, and environmental gains and/or losses. With this information, the reader would be able to define the long-term trends in habitat change.

In Section 3, Environmental Impact of Operation and Maintenance, Subsection Channel Maintenance, an attempt is made to relate the topic directly to acreage increases. The comparison is drawn from what is evident on 1973 aerial photographs and estimates based on 1940 maps. Estimates based on 1940 maps make the comparison invalid. By using Exhibit 76 one can calculate that nearly 25 million cubic yards of spoil were deposited prior to 1940. This is about one-third of the total amount of spoil removed during the life of the project to date. Consequently, by using 1940 maps a large portion of the spoil from the project is ignored or not accounted for.

Erosion of spoil sites varies from a slight movement to entire deposits being washed away. The area affected by spoil movement could be many times the area visible on current aerial photographs. Exhibits 174 through 186 consider only the spoil areas visible in 1973. The original size of the spoil site and the subsequent movement are not taken into account. The dredge spoil disposal records that are available should have been used to estimate percent of the spoil remaining to produce the acreages visible in 1973. Measurement of the spoil areas to calculate the cubic yards of material in those sites, as compared to the records and averages, will produce the percent movement. Indications are that the 2,370 acres reported in Exhibits 174 through 186 represent much less than half of the spoil actually deposited. The discrepancies should be corrected and the implications should be explained in the final statement.

5. The statement neither accurately nor adequately outlines the impacts of "operation and maintenance" on fish and wildlife resources and on their use and importance to a quality environment.

Vegetation types and revegetation are discussed in several sections of the statement. However,the relative values of the habitat types are not compared or otherwise discussed. Supportive data for information given are not referenced or substantiated. Acres of the various habitat types from early aerial photographs as compared to 1973 aerials would have been useful.

The Environmental Setting--Terrestrial Vegetation Section should address the relative values of the vegetation that can be established on spoil deposits. This discussion should include the percent of ground and crown cover as well as the species that make up those ecotones. On page 307, under Channel Maintenance, a statement is made that 45 percent of the spoil deposits have "significant" vegetation. This is only part of the information necessary to determine exactly what the impacts of spoil placement are. The "significant degree" needs definition to be meaningful.

The discussion on revegetation throughout the Alternatives Section should be clarified. Although wildlife habitat may be provided by this means, spoiling replaces highly productive fish and wildlife habitat with sand piles and revegetation provides marginal wildlife habitat at best. It is our belief that this situation should be stated in the Irreversible and Irretrievable Commitments of Resources Section, page 584, where trade-offs are discussed. The irretrievable losses, both quantative and qualitative, include the highly productive floodplain ecosystems being replaced with spoil deposits of very low productivity, flora, and fauna alike.

The Environmental Setting Section makes use of descriptions of the river setting that do not accurately portray the present setting. Pages 110-116 include a paper authored by Dr. William Green (BSFW employee) on ecological changes of the Upper Mississippi River since inception of the 9-foot channel. The original paper, presented at the Midwest Fish and Wildlife Conference in Chicago in 1954, was revised in 1960 to reflect changes which had occurred up to that time. Most of these changes involved population data on birds and animals, but some modification on plant distribution also was made. Although Dr. Green's description of conditions in 1960 was accurate, considerable change has taken place since that time. The spreading of spoil in and over the sloughs and backwaters in many areas has reached the stage where the effects now are apparent. We do not imply that changes were not occurring prior to 1960, but as filling of sloughs and marshes continued, the effects, rather than being subtle and hard to detect, now have become pronounced.

Environmental conditions change, and as such, it is inaccurate and inappropriate to indicate that the 1960 description fits 1974 conditions. Certainly, the plant species list, including percent composition (Exhibit 83), that was compiled in 1947 is not representative of today. Rather, the statement should provide information indicating past and current trends in habitat changes. This is essential before in-depth analyses of impacts of future O&M can be made.

The discussion of actual impacts on fish and wildlife and their human uses is lacking in depth and understanding. The section, Impacts of Dredging on Water Quality, discusses only local disturbances of short duration. Although the statement

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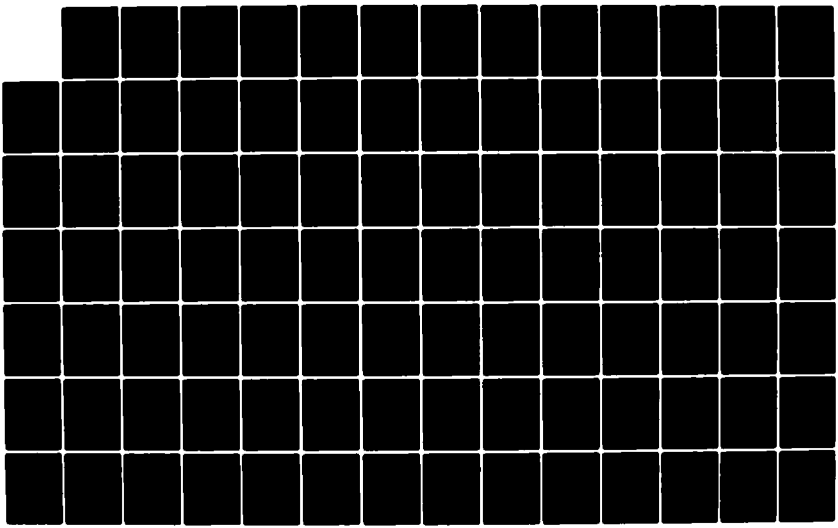

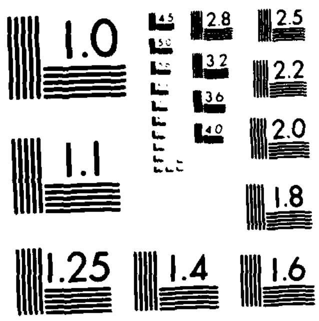

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recognizes that a significant reduction of organisms occurs near the spoil site, it does not discuss the important secondary impacts of these losses. For example, a variety of fish and wildlife depend heavily on the organisms produced in these areas and the resultant loss or lowering of total productivity is not evaluated in respect to the resources. Such losses are meaningful, especially when speaking in terms of spawning and nesting success of fish and wildlife.

A reference is made to the direct loss of 1,300 acres of aquatic habitat, but again this is based on estimates arrived at by comparing 1940 maps and 1973 aerial photographs. The 1,300 acres actually represents only the visible portion of the spoil sites. The total area affected obviously is much larger. For each visible acre of spoil in aquatic habitat, we believe that more than 1 acre of fish producing and feeding area is lost directly and many acres of habitat are degraded. In addition, the productivity of aquatic furbearers is reduced and less food producing area is available for waterfowl. The resultant impact of these losses directly affects human use of these resources.

The opportunity to fish, hunt, and trap that has decreased as a result of habitat degradation is not fully evaluated. Blockage of travel routes utilized by fishermen, hunters, and trappers is discussed on page 318. The statement states that there is no major problem at Wylusing Slough entrance or at the entrance to Harper's Ferry since the entire 1964 spoil deposit washed away. The statement should explain what happened to the spoil that washed away and why the Corps continued to spoil in the mouth of Wylusing Slough after 1965 (i.e., Wylusing, 45,000 cubic yards in 1966; 97,000 cubic yards in 1968; and 81,000 cubic yards in 1969).

6. The statement is difficult to read and understand because of poor organization brought about largely by the separation of tables, graphs, and maps from the text. Moreover, the statement confuses the reader by repeatedly referring to and analyzing initial project effects on the environment rather than addressing the specific issue of "operation and maintenance."

Reducing the sheer bulk of the statement may be difficult, but certainly this is a factor that hampers its readability. It appears that excessive wording could have been avoided. Pages

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186 through 262, with references to Exhibits 111 to 172, are examples of excessive reporting. By reducing the 62 exhibits to 5 or 6 tables and including them in appropriate sections of the text, a more meaningful compilation of data would have been accomplished. Certainly, the location of information and comparison of pool data would be easier; and much redundance (Exhibits vs. Discussion) would be eliminated with a one section evaluation of the combined tables.

Other sections of the statement stray from the topic or include comments that belong elsewhere. Lack of data is common where important impacts or descriptions are discussed. Excessive discussion of only vaguely related topics is used to fill the void of sound data. For instance, the inclusion of the bath tub analogy of how the pools operate during flood periods in Section 3, Environmental Impact of Operation and Maintenance, is a prime example of unnecessary verbage. This explanation is adequately discussed in the Detailed Description of Operation section.

The entire section on the 9-foot channel controversy further illustrates inclusion of unnecessary material. A short review ofthe topic in the historical section is warranted, but the discussion as written is so long and involved that it detracts from the statement. The lengthy letters from various commercial interests included as support for the 9-foot channel add little factual value to the statement.

Many of the maps, charts, graphs, and tables are difficult to interpret. Data contained in Exhibits 107, 109, and 110 are graphed in such a manner that they appear to cover a period of time. This is unfortunate since the totals for individual pools should not be connected in this manner. Perhaps a table or a bar graph would more properly illustrate the information.

Few of the sources of information are credited and a bibliography is not included for location of references. An annotated bibliography is not included for location of references. An annotated bibliography is essential for the reviewer to substantiate the claims made in the statement. These and other apparent weaknesses of the statement possibly could have been avoided if the several volumes of the Environmental Impact Assessment (prepared by Northstar Research) had been utilized fully.

The aforementioned issues relate specifically to our position that the statement is inadequate and misleading. The following issues which are both of a general and specific nature enlarge on our review of the statement.

General:

No established or studied unit of the National Park System appears subject to adverse effect from the action of O&M. In the absence of specific data on proposed spoil sites, however, this determination is based on historic locations as reflected in Exhibits 32 through 42. Any change in these exhibited locations would necessarily require us to review our position. For example, spoil sites at Wyalusing, Wisconsin, just below the mouth of the Wisconsin River, are presently situated approximately 1 mile from the mound location near the mouth of Sny Magill Creek, a detached area of Effigy Mounds National Monument, Iowa.

We see no adverse impact to cultural resources with respect to the dredging operations themselves; however, deposition of the resulting spoil is of concern. Any placement of spoil on floodplain or upland surfaces may potentially affect archaeological resources.

Prior to final determination of spoil deposition areas, the appropriate State Archaeologist should be consulted for information regarding known archaeological values that may be affected. In addition, we suggest that all areas eventually designated for spoil deposition be examined systematically by a professional archaeologist to locate presently unrecorded archaeological remains. If, through these means, it is determined that archaeological remains will be affected by spoil piling, selection of alternatives should be considered. If it is not possible to select an alternative to avoid impact, the endangered resources should be fully assessed.

Archaeological remains constitutes a cultural resource that is fragile and nonrenewable; accordingly, every effort must be made to fully evaluate and record the nature of such resources before a decision is made to adversely affect them through the implementation of any current or proposed action. Burial of such remains, fully assessed and documented, below spoil piles would not preclude necessarily future investigation of these resources. However, surface sites, and those near the water line, are subject to partial or total loss through the hydraulic action of spoil placement by dredge means. We must emphasize that a determination to pile dredge spoil on archaeological resources must be made only in close consultation with appropriate archaeological interests. Such consultation may reveal the feasibility of conducting salvage excavations of endangered resources prior to initiation of deposition activities.

Activities impinging on the trust lands of the Prairie Island Sioux Community raise the following important points of consideration: (1) The practice of depositing river spoil in the vicinity of several inlet channels to North Lake and Sturgeon Lake creates the potential for the introduction of this material into the waters of the lakes. The impact this might have upon the incidental fishing interests of the Prairie Island Sioux Community is an area of concern; and (2) Project activity impact as it affects the identification, protection, and preservation of archaeological and historical sites must be examined thoroughly.

Three major pipelines cross the Mississippi River within the river reach covered by the statement. Northern Natural Gas Company owns an 8-inch pipeline that crosses the river at La Crosse, Wisconsin, and a 24-inch line that crosses between Dakota County, Minnesota, and Washington County, Wisconsin. American Oil Company has an 8-inch production pipeline that crosses the river near the common corner of Washington and Pierce Counties, Wisconsin, and Dakota County, Minnesota. The environmental statement makes no mention of the pipelines. As such, we suggest that the statement include information pertaining to plans of the Corps of Engineers for relocating or protecting the pipelines, particularly during dredging and spoil disposal operations.

Significant adverse impact of OSM functions with respect to the geologic features of the area is not anticipated. However, the statement contains no discussion of the effects of dredge spoil upon the hydraulics of the waterway. The various alternates for disposal of spoil that were considered represent varying degrees of obstruction of the floodway. Their effects upon flood stages merit discussion.

Specific:

Summary - 3.a Environmental Impacts

We do not agree with the implication that the aesthetics of the present river setting and the production of fish and wildlife are "dependent" upon continued O&M functions. A relationship exists only insofar as these resources are damaged by O&M practices.

The sandy islands produced by dredge spoil eventually revegetate in 20 to 30 years, but not by typical bottomland vegetation as stated within the main body of the report (page 102). A few sandy islands receive heavy recreation use; but, in total, only on a small percentage of the dredge spoil areas are used by recreationists and most use is restricted to beaches near the main channel. Dredge spoil normally is placed on the backwater side of islands in areas inaccessible to recreational users.

I. Description of Major Federal Action

Detailed description of maintenance dredging and spoil disposal - The discussion of the dredging operations (page 14, paragraph 1) states that overdepth dredging to 11 feet is often required, and a few lines later that "an additional 2-foot of overdepth dredging is normally accomplished . . . ." Such depths may be needed in special areas where tows start and stop frequently, but we question the need to overdredge in most reaches of the river. Certainly, the conditions under which such overdepth dredging is required, and to what depth, where, and when it will be applied to the proposed 9-foot channel, should be clearly stated. Also, the comparative volumes and impacts associated with overdredging should be identified. As now written, this section suggests a magnitude of dredging that is at considerable variance with the magnitude implicit in the title of the statement. The actual total dredging depths on the Minnesota River also should be stated.

In the discussion of the activities of Dredge Thompson (page 20) a clear distinction should be made between total costs and costs for use within the St. Paul District. The statement does not discuss primary or secondary impacts of O&M within the St. Paul District in respect to the Rock Island District. To clarify the entire cost situation, specific costs for St. Paul District alone are necessary.

It is customary for the Corps of Engineers to inform interested agencies of proposed dredging sites (page 22). However, only a short period, usually less than 1 week, exists between "notification" and "implementation." As such, onsite evaluation and coordination is difficult and, when only 3 days or less are allowed, adequate site evaluation becomes impossible.

The final statement should note the recent commitment made by the Corps of Engineers in a recent meeting of the Upper Mississippi River Basin Commission Task Force on Dredge Spoil. This commitment is to provide 30 days notice to all task force members of all future dredging. Information provided is to include location of dredge cuts, associated values, and proposed dredging dates.

The statement (page 23) that dredge spoil sites were selected in conformance with the 1969 Dredge Spoil Survey is misleading and not entirely correct. Only those sites that were convenient and easily reached were utilized. In actual practice, if recommended sites did not exist within easy reach, the spoil was placed wherever convenient. Many of the recommended spoil sites are now beyond capacity and spoil is spreading beyond the defined site. We understand that it was for these and many other reasons that the 1969 Dredge Spoil Survey report was rescinded by the Upper Mississippi River Conservation Committee.

It should be noted that the annual dredge spoil conferences were initiated in 1971 at the request of concerned agencies. Similar conferences are held each year in the Rock Island and St. Louis Districts to try to resolve difficult problems on specific spoil disposal areas. Since the dredging in the St. Paul District begins soon after the spring flood, little information is available on channel conditions. This causes the difficulties in coordination as to spoil area selection and should not be related to the "conflicting desires among fish and wildlife, recreation, State and Federal interests" (page 24).

Maintenance of Water Quality

Water Quality Improvements, Dams Nos. 4-10

The joint action by the Corps and the Bureau of Sport Fisheries & Wildlife to alleviate low oxygen concentrations below the eight dams (4-10) was successful. However, the statement also should address the long-recognized water quality problem below the Twin Cities which could be improved with aeration structures in Lock and Dams 2 and 3.

Interrelationship and Compatibility of Operation and Maintenance Activities with othe Projects

Upper Iowa River, Iowa

This section (page 44) should be expanded to discuss further the problem of deposited material that takes place as the result of construction activity. We believe that the Upper Iowa River outlet project not only caused heavy siltation of downstream marsh areas at the time of construction but apparently will increase siltation below the mouth. Minnesota Slough similarly has been adversely affected, and in recent years, other chutes and sloughs alike have silted in at an alarming rate. Projects such as the Zumbro River Channelization proposal, Minnesota, definately warrants discussion in the statement.

The Upper Mississippi River Wildlife and Fish Refuge

This section (page 46) states in effect that the Upper Mississippi River Wildlife and Fish Refuge became a reality to a large degree as a result of the 9-foot channel project. Actually, the refuge system predates the 9-foot channel project by 6 years and is not a result of the project as implied. However, as a result of the 9-foot channel project, thousands of acres of former refuge lands were inundated and are now below the normal high water mark and serve the interest of navigation rather than being available solely for the purpose of wildlife and fish. Although approximately 43,000 acres of project-acquired land are now under cooperative management agreement with the U.S. Fish and Wildlife Service, the management rights on these lands (CE) are not comparable to such rights on previously existing refuge lands since they are clouded by ownership questions. This difference should be examined in the statement, and the acres under refuge management before and after the 9-foot channel should be made known.

2. Environmental Setting

Physical Aspects of Study Area - Groundwater

In the discussion of groundwater (starting on page 47), some statements should be corrected or expanded to avoid confusion. The dolomite strata under discussion are fractured and jointed and may be cavernous in places, but we do not believe that they are cavernous generally. The use of the term "large springs" (last line) may be misleading and should be defined in terms of discharge per unit of time.

With reference to page 58, paragraph 2, there are many communities around the Twin Cities utilizing deep wells; thus, we suggest that 13 communities mentioned by fully identified. In sentence three of the same paragraph, 200 mgd is estimated to be one-fourth of the sustained yield. We believe that 200 mgd may be more nearly 50 percent of the sustained yield under natural conditions, but in either case, the area under discussion needs to be more clearly defined.

"This highly productive aquifer" (page 60, paragraph 2) refers to the water table of the floodplain--a geographic feature which is not an aquifer. The alluvium of valley fill underlying the floodplain is the aquifer. In the same paragraph, what is the basis of the third sentence? We doubt that "Groundwater from a maximum depth of approximately 100 feet is largely natural filtered river water," as the river valley is normally the groundwater discharge area with groundwater flowing to the river.

In the discussion of surface water (page 71 and Exhibit 62), the data are compiled only through the year 1965. We note the second highest flood of record occurred at St. Paul on April 15, 1969, with 156,000 cfs and a stage of 24.52 feet. The data should be updated, discussed and compared with other floods. The 1969 flood was the third highest flood of record at the Minnesota River at Mankato, Minnesota.

Sedimentation

The discussion on sedimentation, starting on page 74, is confusing to the reader because "total load" and "bedload" are intermingled in the discussion and in presentation of the data.

While it is true, (page 74) that in certain instances agricultural land in small areas can be damaged by flood-water-deposited sand and gravel, it should likewise be pointed out that floods often make river floodplains highly productive areas for many plant and animal communities. The slow moving water over most of the floodplain during floods causes the finer silt to drop out and it is this rich, organic material that nourishes the floodplain.

Sedimentation and Dredging in the Navigation Pools

Item (d) on page 85 discusses the nature of the stream bedload. We question the basis for assuming the Mississippi River to be in near equilibrium with the present rate of incoming sediment. The data presented do not support such an assumption. A possible contradiction exists between information presented in the second paragraph on page 79 and the narrative interpretation of Exhibit 66 presented on page 85. Since bedload is the only material dredged, if the average bedload carried by streams in the Upper Mississippi River Basin averages 10 percent of the total sediment transported (page 79), and an average of 7 percent of total incoming sediment is dredged (page 85), then the Corps actually dredges 70 percent of the bedload. This means that, either the dredging activities are of a greater magnitude than stated in the EIS or calculations of trap efficiency are based on inaccurate data.

Geological Analysis of Chippewa River Sedimentation Effects

In order to fully evaluate the retained capability of the river for carrying most of the bedload 3 miles downstream from the mouth of the Chippewa River, this section should discuss the impacts of the many man-made structures, such as 40 to 50 wing dams, the highway bridge and numerous developments along the shoreline. The capability to carry sediments is a forced capability, not the natural capability implied in the statement.

A major fallacy exists in the sampling design used to obtain data for Exhibit 71 referenced in this section. A natural gradation of the material on a spoil site occurs from wind and water erosion. The larger particles remain as the fines are washed or blown from the site. This would tend to distort the percentages of particle size toward the larger sizes.

Sufficient data are not presented to verify the computations on sediment. We note that the total average annual dredging for all pools equals 1,934,000 tons per year (Exhibit 66). Using 1.35 tons per cubic yard (page 93), the average annual dredging equals 1,432,000 cubic yards per year, but an average of 1,600,000 cubic yards is given on page 20.

Trends

The discussion of Exhibits 75 and 76 indicating a trend toward less dredging is misleading. The statement also should discuss the use of the Dredge Thompson in the Rock Island District, possible completion of dredging to the project depths in the late 1940s and impacts of drought or high water as it influences volumes dredged. The statement gives no consideration to the fact that, if the last 15 years were given a trend line, it would go upward sharply.

Biological Aspects of Study Area

Terrestrial Vegetation

Reference is made to the tap root developed by cottonwoods (pages 101 and 103). This is incorrect since cottonwoods have a small tap root and a large superficial root system.

There is no basis for the statement that terrestrial vegetation has not changed significantly since inundation. Extensive changes have occurred where vegetation is buried or dies as a result of being partially covered with spoil. Additional vegetational changes have resulted from the movement of spoil material after it is placed, such as shoaling in open water, and the subsequent encroachment of willows.

Aquatic Vegetation

The habitat described in the table on page 106 of the statement should correspond to USDI--Fish and Wildlife Circular 39, Wetlands of the United States, and the discussion should be correlated around these established habitat types.

The Minnesota River

The reference to high phytoplankton densities of 1964 on page 108, should be either expanded to relate it to the rest of the topic or deleted.

Birds

Waterfowl

The reference to hunter success and hunter trips (page 122) should be expanded and would be more appropriately addressed in the section on recreation. Clarification is needed as to what goose population is being discussed. The statement indicates that most geese stop at Necedah Refuge but does not mention the very important Horicon flock. The discussion on wood ducks is not entirely accurate. For example, the statement that ducklings are unable to cross railroad tracks is incorrect. Broods can and do cross the railroad tracks.

Predatory Birds

This section is not correct in its discussion on eagles, since eagles also winter below Locks and Dams 8 and 9. Except for the foot of Lake Pepin there are often higher numbers below Locks and Dams 8 and 9 than anywhere else in the St. Paul District. The 1-day eagle count on January 16, 1974, showed only 15 eagles in Pools 4, 5, 5A, and 6, while Pool 9 had 32. The final statement should include this information.

Upland Game and Miscellaneous Birds

The discussion on abundance of ducks on page 129 should be revised. Scaup numbers are lower now than a few years ago; while in the fall of 1973, record high concentrations of canvasbacks were recorded in Pools 7 and 8.

Although this section refers to a deterioration of submerged vegetation, the causes of this deterioration are not included. Further discussion of this point is warranted.

Fish

In the discussion of paddlefish and other migratory fish (page 135), a questionable correlation is drawn between the Keokuk Dam and the disappearance of the skipjack and blue sucker. The Keokuk Dam was constructed 17 years prior to the 9-foot channel project. The installation of the lock and dam system in 1930 and the disappearance of the skipjack and blue sucker 20 years ago is a more reasonable correlation.

The filling of some backwater sloughs by sedimentation is cited on page 136 as the reason for oxygen depletion and winterkill. Dredge spoil closures of side channels and shoaling from dredge spoil sites are often responsible for this impact. The final impact statement should identify areas of natural deterioration and areas degraded by spoil deposits.

The discussion should include effects that continued operation and maintenance have on the low populations of sturgeon.

Aquatic Invertebrate Animals

Current data on mussels should be included in this section (page 137). Exhibit 95 provides a list of mussels from preimpoundment times but material relative to today is lacking. References to more recent studies and lists are made in the section on Fresh Water Mussels but are not listed or correlated to the list in Exhibit 95. A comparison of mussels present originally and currently would provide a valuable indication of impacts from O&M. Mussels are very sensitive to sudden changes in water quality and sedimentation.

Socioeconomic Setting

Waterborne Commerce

This entire section (page 174) is in need of revision and expansion. Comparable data for railroads and other means of transportation should be included. Actual costs of transporting commodities between major population centers would provide more meaningful data than costs per ton-mile.

Contrary to the last paragraph in this section, pollution from dredging, spoiling, lock and dam maintenance, large boats and tows, bilge draining, and barge cleaning is significant. Although there may be larger sources of pollution on the river, O&M pollution stemming from O&M sources is an issue of major concern, and should be addressed in the statement.

Commercial Fishing and Trapping

The limited commercial fishing data used in this section (page 178) and the inferences drawn from this data are questionable. Using only 1960 and 1969 data, when considerable information was available, does not adequately portray the commercial fishing situation. Available data from the late 1800s to 1972 should be included in the statement. The contention that commercial fishing improved with installation of the 9-foot channel project should be supported by data. Certainly, Exhibit 107 does not contain the necessary information to substantiate the claim of a 9 percent increase in harvest. By using the data presented for 1969 and more recent data, one also can show that production has decreased 29 percent since 1969 (based on 3.9 million pound of fish caught in 1972). The indication that Pools 4, 8, 9, and 10 produce the most fish is the only valid information given. Overall trends in the catch and, of particular importance, the change in species composition of the catch should be explored; and a detailed discussion on changes in fish movements or concentrations that result from the O&M activities, particularly dredging is needed. Also, an analysis of changes in commercial catch resulting from market changes and improved fishing equipment and techniques would add considerable to this section on commercial fishing.

Trends in the fur harvest and the impacts of the O&M activities on the fur harvest must be discussed if the statement is to be complete. We believe, too, that fluctuations in the harvest that result from changes in demand for furs would be a factor in the analysis. Incidentally, the value of furs from the Upper Mississippi River Wild Life and Fish Refuge is expected to top $500,000 for 1973-1974.

Recreation

Projected recreation use data provided are based on 1960 census data and are not valid today. More recent data on recreation needs would be desirable for discussion in this section. This data should be available from the State Comprehensive Outdoor Recreation Plans.

On page 180, second paragraph, the phrase, "significant portion of today's recreational activity . . ." needs to be quantified. Recreation activities have increased and are projected to increase at an even greater rate, but the exact influences that O&M functions have had on recreation is not addressed.

Boating Activity and Related Facilities

Exhibit 109 utilizes only a small portion of the data available. Additional data should be included to show trends in these activities. Connecting the numbers to form a graph does little to help illustrate the data. Complete data for all years of record should be tabulated and the trends and reasons for the trends fully discussed.

Additional information is required on the capabilities of the locks to handle the increases. Reasons for heavier use of certain locks should be given. There are other available studies of boating activity on the river that would be more useful than boat counts through the locks. The Upper Mississippi River Conservation Committee's Fisheries Compendium of March 1967 would be a good source, as would the UMRCC Sport Fisheries Survey of 1962-63 and 1967-68.

Sport Fishing and Hunting

Exhibit 110 (page 185) makes use of only a small amount of the data available. Analyses of who the fishermen are, where they come from, how long they have fished and what they are fishing for are important questions that should receive consideration. It would be desirable to identify fishing activities in and around areas that are affected directly by dredging.

Similar omissions exist in the discussion of hunting and hunters. The number of hunters, hunter trips, success ratio, and many other factors are needed. The interrelationship of dredging and spoiling ahd hunting should be addressed.

Socioeconomic Factors Pool-by-Pool

This section lists factors pool-by-pool. Along this stretch are located a number of parks which have been developed along the banks of the river with assistance from Land and Water Conservation Funds. Dredging operations should be coordinated closely with the states to insure that the spoil placement does not affect, adversely, the park areas.

Summary of Major Beneficial and Adverse Impacts of the 9-Foot Channel Project

This summary should address the subject of pollution from barge spillage and cleaning, which is passed over as insignificant (pages 178 and 333). Only one sentence is devoted to these impacts on surface water and water quality (page 265). This subject should be addressed again in subsequent pertinent sections of the statement.

Impacts on Fish and Wildlife

We agree that the large-scale fish rescue operations mentioned on page 266 were made unnecessary by the 9-foot project. However, the statement should recognize that the initial problem was in part a function of man-made physical restrictions placed on the river to attain the 4 1/2-foot and then the 6-foot channels.

Impacts on Recreation and Aesthetics

We question the contention that piles of sand, 20 to 30 feet high and covering many acres of the natural beauty of the floodplain are "beautiful beaches" (page 238). Although there are spoil islands that accommodate recreational use, these make up only a small percentage of the spoil placed in the floodplain.

In addition, the sandy beaches on the main channel are not always conducive to recreational use due to their steep slopes. The more desirable slopes on the back side of the islands often are not used as the water passages usually are filled with sediment and are not accessible to boaters.

Although the aesthetic appeal and recreation potential have been reduced by urban development, they also have been reduced by dredge spoil piles, levees and other flood control structures constructed by the Corps of Engineers. In addition, the increased frequency of oil and sludge from barge washing or bilge discharge are aesthetically and environmentally degrading, and we suggest they be so recognized in the final statement.

The discussion of difficulties encountered by recreational traffic on the river from long waits at locks is not complete. The priorities that exist for use of these public facilities should be listed and explained. Since the channel is maintained primarily for the large commercial barges, it would add to the statement to explain why the main users of the deep channel do not have to pay for the use. Most recreational craft can navigate on the river without the aid of dredging so their cost would be much less for use of the locks. Since the holidays create a particularly bad conflict at the locks, the statement should evaluate the possibility of restricting barge traffic on specified holidays much as trucks are prevented from disrupting traffic during peak road use.

Inundated wing dams and closing dams are recognized as being navigation hazards but usually are unmarked (page 269). It would appear that this hazard could be minimized and, therefore, should be discussed.

Future Setting Without Operation and Maintenance Activities

We agree that fewer project-related beneficial impacts would be retained without O&M activities, but to assume that the locks and dams would be completely removed as part of the "no project" considerations is not realistic or a proper basis for analysis (page 272). Environmental impacts, especially in respect to O&M functions, should be made with the locks and dams in place.

The list of complicated factors considered in evaluating transportation systems is not complete. Such factors as the greater versatility and faster delivery time of railroads require attention. These could be listed as factors "g" and "h" in the listing on page 275.

Barge Transportation and Energy Use

Present relative energy use studies by the Department of Transportation show that shipment by rail consumes less energy than shipment by barge (page 275). This data should be referenced and utilized. We suggest, too, that the study results on page 283 also be discussed in this section.

Barge Transportation and Air Pollution

A section entitled Barge Transportation and Water Pollution, following the section on air pollution, would add considerably to the statement. Such a new section should discuss barge related pollution such as barge loading and cleaning. In addition, regulations for prevention of accidents resulting from overloading or underpowered tows should be taken into account.

Barge Transportation and Cost Savings

The letters from the commercial interests are not appropriate (page 278). This material properly belongs in an appendix for comments from interested groups and agencies.

Projects and Proposals of Other Agencies

This section (page 283) also should mention the Memorial Hardwood State Forest in southeastern Minnesota. It will ultimately consist of some 200,000 acres in eight counties, five of which are located along the Mississippi River. The establishment of this forest would have a direct relationship on the reduction of sediments in some of the tributaries of the Mississippi River. More information can be obtained from the Minnesota Department of Natural Resources.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 242

3. Environmental Impact of Operation and Maintenance

Impacts on Water Quality

The impacts on water quality from maintenance activities on the locks and dams require consideration. The problem of pollution from refinishing and repainting as well as runoff from machinery maintenance and road work on the lock property should be discussed.

Aeration of Backwaters

The statement adequately describes the value of aeration structures (page 300), but does not show the relationship to navigation and O&M functions. Incidentally, the notches and culverts appear to have been a part of the project as written in this statement. It should be mentioned that these features were constructed out of O&M funds and under the authority of correcting project "deficiencies."

Impacts of Dredging on Water Quality

The discussion of the impacts on water quality that were investigated near Crosby Slough needs expanding. For example, how long is the "relatively short period of time" referred to on page 303 for water quality parameters to return to predredging status? What are the differences between areas frequently dredged and those dredged only once? What changes in depth have occurred downstream?

Impacts on Aquatic Vegetation and Animal Life

Channel Maintenance

This section should comment more fully on impacts rather than referring the reader to exhibits to analyze those impacts. The generalized descriptions of what happens to submerged plant and animal life should be better documented and impacts on land species should be included. Related impacts on human use should be included.

Recreation

It is mentioned on page 323 that the present situation warrants a study to determine the need for facility development. The Master Recreation Plan mentioned on page 268 may alleviate the need for the study in question.

Recreation needs should be closely correlated with the following section on Public Health and Safety to interrelate the expected rise in use of the river to an increasing chance of serious accidents on or near spoil islands. The Recreation section should address the heavy use of particular areas. Spoil islands dedicated to recreational use would then have more relevancy to the impact statement, particularly as alternatives are considered.

The impacts of severe undercutting caused by erosion of the spoil along the main channel should be discussed. This could reduce the value of these undeveloped areas for recreation use.

Public Health and Safety

The impacts of pollution from recreation boaters also should be discussed in this section (page 324).

Economic

This section (page 325) discusses only those economic benefits to recreation, but it is difficult to define those benefits that are deemed solely O&M. It would be proper to separate all benefits as to the project itself, O&M, and what would occur without the project and operation and maintenance.

Remedial, Mitigative and Protective Measures

This section (page 328) discusses only limited protective measures that have been initiated recently through cooperative efforts of environmental interests and the Corps of Engineers. The placement of spoil was not accomplished according to the desires of the Bureau of Sport Fisheries & Wildlife. Extreme limitations of the Corps of Engineers equipment largely governed spoil placement. The alleged expenditure of $100,000, apparently to break pipe for passing tows and to reduce environmental damage, is a small sum when compared to the millions that are spent annually on maintaining the channel.

The aeration structures discussed are remedial efforts that were initiated at the request of the Bureau of Sport Fisheries and Wildlife. These measures corrected engineering deficiencies in the initial project. It would be proper for the statement to consider correcting damages from O&M such as revegetating spoil sites and reopening side channels closed by dredge spoil. No mention is made in this section of compensating for environmental losses caused by destructive spoiling operation or any concrete plans for disposal area selection to minimize harm.

4. Unavoidable Adverse Impacts of Operation and Maintenance

Although we agree with the general premise that some habitat conversion is necessary regardless of the alternative chosen, many alternatives can be accomplished without sacrificing the authorized purpose of the project.

The statement discusses several possible alternatives that would not substitute sand piles for good habitats. The last sentence in the paragraph on page 331 is justification with no relationship to unavoidable adverse impacts.

Since barge transportation is integrally related to project operations and maintenance and has been used previously to determine benefits, unavoidable adverse impacts resulting from deep water traffic should be addressed in this section. Such impacts include continual pollution resulting from normal river traffic and potential pollution associated with the shipping of toxic or hazardous products on the Mississippi River.

5. Alternatives

The statement contains considerable amount of detail, identifying numerous alternatives and the impact of each of the alternatives. Although not clearly stated, it is assumed that the "status quo" alternative is the selected alternative. The dredge and disposal method in the past has had the benefit of designated sites for spoil placement, which apparently is not the case at this time because the 1969 Dredge Spoil Survey Report has been rescinded. The statement does not specifically define sites for spoil placements; therefore, it is assumed that such spoil placement will depend on existing equipment capabilities and will result in the least adverse impact attainable with this equipment. This leaves the reader in doubt as to what the real impacts will be until such sites can be more specifically defined.

Although it obviously would not be realistic to consider total abandonment of the navigation system in favor of other modes of transportation, the alternatives section should address itself to other modes of transportation as an alternative to navigation, thus, eliminating the need for perpetual maintenance of the navigation channel and the environmental impacts resulting from such maintenance.

Watershed Land Treatment

The statement is made on page 344 that "Adopting these or any other watershed land treatment measures in headwater areas would probably have little or no effect on dredging for many years, if ever." However, on page 94 of this statement one of the reasons stated for the decline in dredging trends in the St. Paul District is: "Bank stabilization and land treatment measures instituted particularly within the last 40 years may have reduced sediment yield at its primary sources." These two statements are contradictory and should be resolved.

Watershed land treatment cannot be dismissed simply because it would cost more than dredging. Watershed land treatment would provide more benefits than just to relieve dredging and, therefore, the costs cannot be directly compared.

Sediment Deposition Control Structures

It is stated correctly that there are a variety of opinions on how sedimentation should be controlled. However, this is true only for control measures within the floodplain. It should be pointed out that there is general agreement among concerned agencies that the sediment should be prevented from entering the river. Treatment measures on or along the Chippewa River may be entirely reasonable.

The discussion of emergent wing dams should include a description of the impacts of the sand trapping between consecutive wing dams. Such sand trapping channelizes the river drastically as evidenced in the St. Louis District. The accretion of sand to levels above normal pool heights creates dry land in areas that formerly were high quality aquatic habitat. The possible increase in flood levels resulting from new structures also should be discussed. Such navigation structures appear to be responsible, to a degree, for the increasing flood heights as seemingly demonstrated in the flood records of the St. Louis District.

Placement of Dredged Spoil

Remove from Floodplain

The dredging and handling costs indicated (page 383) are well above those of private sand and gravel companies. These companies handle millions of cubic yards of sand with hydraulic equipment and move it to stockpiles off the floodplain. Their range of costs is from \$ .75 to \$2.00 per cubic yard based on a 1973 study by the Bureau of Sport Fisheries & Wildlife. This can be compared to similar operations by the Corps with costs estimated at \$1.40 to \$5.80 per cubic yard. These figures are from cost estimates on page 383, less the cost of moving the material 25 miles and without the prorated increase in costs from the Rock Island District. If these cost estimates are accurate, consideration should be given to private contracting as an alternative.

There is nothing in this statement to support the contention on page 384 that the biological life of the river will necessarily be short as a result of natural sedimentation, since removal of 70 percent of the bedload by dredging offsets much of the natural sedimentation. Specific contributions of backwater filling by bedload and suspended sediments should be addressed.

Although removal of spoil from stockpiles will require additional trains, barges or trucks, the statement does not provide information concerning the additional transportation facilities needed. Therefore, there is insufficient data to support conclusions reached against removal of stockpiled sand from the floodplain.

Dredge Operations

Size of Dredge Cut

In the discussion on widths of channel maintained, consideration of passing lanes in certain sections of the river should be included. In combination with reductions in depths of each dredging cut, a substantial reduction in the volume of material removed possibly could be realized. The final statement should include fluvial impacts of overdredging and the hydrologic impact of continued status quo spoiling in relation to fish and wildlife and the integrity of the floodway.

Since overdredging to a depth of 13 feet accounts for a major part of the dredge material (over 40 percent, page 397), it warrants closer and more detailed description. If overdredging is required at every dredged site, this should be made quite clear. The statement also should indicate whether some reaches need to be dredged only rarely, and are located such that tugs normally pass through at a uniform speed so that "windrowing" is rare. From the statements given on page 397, it seems possible that overdredging could be reduced for nonproblem reaches, but that it is necessary at other locations. A site-by-site study of reaches requiring dredging may result in the adoption of a different policy on overdredging and, if so, should be included in the statement as an alternative.

Dredge Openings into Backwater Areas

Natural channel openings into backwater areas are often much less than 125 feet. There are many important small openings frequently used by shallow draft watercraft. These openings are important feeders into backwater areas.

The authorization necessary for dredging outside the main channel was evidently available in 1964 when the Dredge Thompson dredged over 300,000 cubic yards, approximately one-half mile up the Chippewa River. If the need for new authorization exists, the authority changes necessary to allow off-channel dredging should be described.

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 242

DEPARTMENT OF TRANSPORTATION
SECRETARIAL REPRESENTATIVE
REGION VII

April 2, 1974

Colonel Rodney E. Cox
District Engineer
St. Paul District, Corps of Engineers
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

This is in response to your request for comments on the Draft Environmental Impact Statement for the Operation and Maintenance, 9-foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenburg, Iowa. We feel that the Final should provide additional details concerning indirect or secondary impacts resulting from Operation and Maintenance of the 9-foot Channel, and suggest the following items be made available to the Corps for consideration.

1. A secondary impact resulting from the proposed action will be the need to continue the operation and maintenance of highways and railroads as distribution systems to and from the terminal facilities adjacent to the Navigation Channel. To better measure these secondary impacts, an estimate of the tonnage now handled and anticipated to be handled by railroads and truck transport from the terminal facilities would be beneficial. In this Region we are primarily concerned with facilities adjacent to Pool Ten.

2. Another indirect impact will be associated with the potential for increased economic, commercial, industrial, and residential growth adjacent to the Channel. Dependent upon the existing physical alignments and usage of highways, such potential or encouraged growth could require the reconstruction or betterment of many highways.

The U. S. Coast Guard Second District will respond directly to you regarding this statement.

We appreciate the opportunity to review and comment on this draft and look forward to the Final Statement.

Sincerely,

R. R. Waesche

R. R. Waesche, RADM USCG (Ret.)
Secretarial Representative
Region VII

CORPS OF ENGINEERS

ST. PAUL DISTRICT
EXHIBIT 243

LETTER OF COMMENT
U.S. DEPARTMENT OF TRANSPORTATION

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS
U.S. COAST GUARD (G-WS/73)
400 SEVENTH STREET SW
WASHINGTON D.C. 20590
PHONE (202) 426-2262

10 APR ...

Colonel Rodney E. Fox
Department of the Army
St. Paul District, Corps of
Engineers
1210 U. S. Post Office & Custom
House
St. Paul, Minnesota 55101

Dear Colonel Fox:

This is in response to your letter of 21 February 1974 concerning the draft environmental impact statement for Operation and Maintenance of the 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa.

The concerned operating administrations and staff of the Department of Transportation have reviewed the material submitted. The Federal Highway Administration had the following comments to offer:

"The statement adequately covers direct impacts upon highways and FHWA program. We feel, however, that the Final should provide additional details concerning indirect or secondary impacts resulting from Operation and Maintenance of the 9-foot Channel. We suggest the following items be made available to the Corps for their consideration.

"A secondary impact resulting from the proposed action will be the need to continue the operation and maintenance of highways and railroads as distribution systems to and from the terminal facilities adjacent to the Navigation Channel. To better measure these secondary impacts, an estimate of the tonnage now handled and anticipated to be handled by railroads and truck transport from the terminal facilities would be beneficial. In this Region we are primarily concerned with facilities adjacent to Pool Ten.

"Another indirect impact will be associated with the potential for increased economic, commercial, industrial, and residential growth adjacent to the Channel. Dependent upon the existing physical alignments and usage of highways, such potential or encouraged growth could require the reconstruction or betterment of many highways."

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 244

LETTER OF COMMENT
U.S. DEPARTMENT OF TRANSPORTATION
U.S. COAST GUARD

The Coast Guard commented as follows:

"The operation and maintenance of 13 locks and dams, and dredging necessary to maintain a nine foot channel are essential to navigation on the Upper Mississippi River. The main question raised seems to be where to place the spoils after dredging. This statement has described four alternative methods of handling spoils: selective placement, remote disposal, central disposal, and removal from the floodplain. All these methods have the potential to lessen the impact of the spoils placement upon the aquatic environment. They will also increase costs of maintenance.

"The alternatives of ceasing all operation and maintenance activities, or providing a navigation channel of lesser depth than 9 feet, are not acceptable to the interests of navigation on the Upper Mississippi River. If dredging is not maintained, or a channel of less than 9 feet in depth was maintained, we feel that there would be an increased potential for groundings and accidents due to the low water channel. Thus, the potential for environmental degradation due to spills of oil and hazardous substances would increase. This potential impact wasn't covered in the statement. If dredging isn't maintained this season, the Coast Guard may have trouble getting its buoy tenders into position to place buoys marking what channel does exist. If the buoy system is not maintained, the potential for accidents and spills will increase.

"The contention is raised that the dredging and the placement of spoils has the potential to adversely affect the quality of the aquatic environment, and therefore the human environment as well. More definite, we feel, is that navigation and anchorage on the Upper Mississippi River will be adversely affected if dredging is not maintained. We also feel that this would lead to a more definite impact to the way of life of people who derive their livelihood from the river or depend on it for products and services. If the river transport of commodities stops, those living in the area would be affected by increased prices for products and services, or their disappearance altogether. To us it appears that the slowing or stoppage of navigation on the Upper Mississippi River is the more serious impact. The importance of river navigation in the region's transportation planning should be stressed."

The Department of Transportation has no objection to this project nor do we have any further comments to offer. The final environmental statement, however, should address the concerns of the Federal Highway Administration and of the Coast Guard.

The opportunity to review this draft environmental impact statement is appreciated.

Sincerely,

By

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FEDERAL POWER COMMISSION

REGIONAL OFFICE

United States Custom House
610 S. Canal Street, Room 1051
Chicago, Illinois 60607

April 5, 1974

Colonel Rodney E. Cox
District Engineer
St. Paul District, Corps of Engineers
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

We have reviewed the Draft Environmental Impact Statement for Operation and Maintenance of the 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa, furnished us with your letter of February 21, 1974. You request our comments.

There are three hydroelectric power projects licensed by FPC located in the Twin Cities area below the head of navigation. They are the Hennepin Island power plant of Northern States Power Company, located below the Upper St. Anthony Falls dam with an installation of 12,400 kilowatts and the Lower Dam hydroelectric power installation of Northern States Power Company located below the Lower St. Anthony Falls dam with an installed capacity of 8,000 kilowatts. These two projects operate under FPC License Project No. 2056. There is also a power plant operated by the Ford Motor Company at Lock and Dam No. 1. This power plant has an installed capacity of 14,400 kilowatts and is operated under FPC License No. 362. The proposed dredging operations above and below the FPC licensed projects will have no apparent adverse affects on the operation. Also, there are a number of natural gas pipelines and electric power transmission lines crossing or adjacent to the navigation channel but these would not be affected by the proposed action assuming the exercise of prudent care in the operation.

The maintenance of the 9-foot navigation channel is essential to the continued operation of fossil-fuel burning electric power plants located along and adjacent to the channel in that it provides waterborne transportation for coal and petroleum. Continued operation of these plants is necessary to assure reliability of electric power throughout the Upper Mississippi Basin.

The foregoing comments are those of this office and therefore do not necessarily represent the views of the Federal Power Commission itself.

Thank you for the opportunity to comment on the Draft Environmental Statement.

Sincerely yours,

Lenard B. Young
Regional Engineer

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 245

LETTER OF COMMENT
FEDERAL POWER COMMISSION

MINNESOTA-WISCONSIN BOUNDARY AREA COMMISSION
619 SECOND STREET, HUDSON, WISCONSIN 54016
Established 1965 by Interstate Compact

Minnesota Telephone (612) 436-7131
Wisconsin Telephone (715) 386-9444

May 6, 1974

Colonel Rodney E. Cox, District Engineer
St. Paul District
U. S. Army Corps of Engineers
1210 U. S. Post Office & Customs House
St. Paul, Minnesota 55101

Dear Colonel Cox:

Enclosed are the comments of the Minnesota-Wisconsin Boundary Area Commission on the Draft Environmental Impact Statement regarding the Operation and Maintenance of the Upper Mississippi River 9-foot Navigation Channel from Head of Navigation to Guttenberg, Iowa.

We sincerely appreciate having had the opportunity to review and comment on this important document. We have done so in good faith and for the purpose of assisting the Corps in the filing of a Final Statement which will be a balanced document for decision-making in the public interest. As our Introduction to the Findings and Comments indicates, the Commission and its staff and technical consultants have devoted most of their time in the past two months to the preparation of these comments. We are confident that you and your staff will give them the same kind of careful consideration during the preparation of the Final Environmental Impact Statement.

You were kind enough to provide the Commission with twelve copies of the Draft Statement. We would certanly appreciate receiving the same number of copies of the Final Statement when it becomes available.

We offer our services for whatever advantage they might be to you in the preparation of the Final Statement and the conduct of the hearings recommended in our Principal Finding No. 2.

In accordance with Section 1500.11(a) of the Council on Environmental Quality Guidelines for Preparation of Environmental Impact Statements, we have transmitted five copies of the enclosed comments to the Council.

Very truly yours,

MINNESOTA-WISCONSIN BOUNDARY AREA COMMISSION

Flagler F. Flinchbaugh

Flagler F. Flinchbaugh, Chairman

cc: Commission Members

Enclosure

FFF/j

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 246

LETTER OF COMMENT
MINNESOTA-WISCONSIN BOUNDARY AREA COMMISSION

FINDINGS AND COMMENTS

ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT OF THE U. S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT, CONCERNING THE PROPOSED CONTINUATION OF OPERATION AND MAINTENANCE ACTIONS ON THE UPPER MISSISSIPPI RIVER 9-FOOT NAVIGATION CHANNEL FROM THE HEAD OF NAVIGATION TO GUTTENBERG, IOWA

Prepared and Submitted by:

MINNESOTA-WISCONSIN BOUNDARY AREA COMMISSION
619 Second Street, Hudson, Wisconsin 54016

May 6, 1974

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 246

PART I. <u>INTRODUCTION</u> (Purpose: To identify the role of the Minnesota-Wisconsin Boundary Area Commission as a commenting agency; to describe the Commission's activities relative to the review of the EIS; and to outline the criteria against which the EIS was evaluated by the Commission.)

1. The Minnesota-Wisconsin Boundary Area Commission is the interstate agency created and financed by the States of Minnesota and Wisconsin to advise on substantive issues of interest to the two States relating to the wise use, development and protection of the waters, lands and river valleys which form the common border between the two States. Its principal jurisdictions are the Upper Mississippi and St. Croix River Corridors. The Commission is composed of ten citizen members, five from each State, appointed by their respective governors. They serve on a part-time basis without pay. The Commission maintains a full-time staff consisting of an Executive Director and Staff Secretary. It maintains an office and interstate service center in Hudson, Wisconsin. The Commission was established by Interstate Compact in 1965.

2. In pursuit of its responsibilities concerning the request from the St. Paul District Engineer of the Corps of Engineers for comments on the subject draft EIS, the Commission undertook to respond as an independent agency. Thus, the Findings and Comments herein are those of the Commission and are not to be viewed as statements of the State governments of either Minnesota or Wisconsin. The Commission sought to evaluate the draft EIS document in an atmosphere representative of the broadest possible range of public interests, and did so in good faith.

3. In preparation for its review of this draft EIS, the Commission conducted the following activities: (a) meetings with the St. Paul District Engineer in February of 1973, November of 1973, and January of 1974; (b) a special public dredge spoil conference in Winona, Minnesota, in September of 1973, including a field inspection of dredge spoil sites in Pool 5; (c) staff visits to the St. Paul District office and participation in Corps budget hearings in Washington, D. C. in March and May of 1974.

4. The actual review process of the Commission involved the following: (a) a six-week review effort by a staff-consultant team, including the Commission Executive Director, a professional biologist-ecologist, and a professor of agricultural engineering specializing in hydrology, sedimentation and soil erosion; (b) two meetings of the Commission's Mississippi Regional Committee; and (c) Commissioner review and public Commission meeting.

5. The criteria used in Commission review were: CEQ Guidelines for commenting entities (Sec. 1500.9(e); adherance by the Corps to provisions of NEPA and related regulations; extent of consideration of all public interests in the resource in a balanced presentation; and adherance by the Corps to accepted standards of objectivity, adequacy, relevancy, consistency, accuracy and significance in terms of the draft EIS content.

PART II. <u>PRINCIPAL FINDINGS</u> (Purpose: To provide an overview of the Commission's observations on the substantive issues related to the draft EIS; to emphasize key points omitted from the EIS; and to summarize Commission conclusions based upon the extensive list of Specific Comments in Part III.)

1. The Commission concurs in the designation of the 9-foot channel operation and maintenance (O & M) activities as "a major Federal action significantly affecting the quality of the human environment" as defined by the National Environmental Policy Act (NEPA) of 1969. The Commission believes that factors cited by the Council on Environmental Quality (CEQ) Guidelines, Sec. 1500.6(1), namely, 'cumulative impact, related Federal actions and projects in the area, and further actions contemplated," are pertinent issues for an Environmental Impact Statement (EIS) in this instance. Thus, the preparation and utilization of such a statement is appropriate and all applicable provisions and requirements of NEPA and related Federal Regulations must be followed.

2. The draft EIS was given wide distribution among Federal and State government officials and agencies, conservation organizations, transportation companies in the waterway and railroad sectors, industrial concerns and public libraries. However, input opportunities for local public officials and private citizens were severely limited by the lack of public hearings or meetings on the document. Considering the extent of public interest in the proposed action, this deficiency is contrary to the spirit of NEPA and related regulations concerning public participation in the decision-making process. Especially noteworthy is the Corps of Engineers' Guideline entitled "The Corps and the Public" (ER 1165-2-500, Appendix A, 30 Nov 70), which states:

> "As a public agency the Corps responds to the public interest. That interest synthesizes many needs, desires and aspirations. It finds expression in the views of individuals and groups and and their representatives at local, State and Federal levels of government. We in the Corps of Engineers have an obligation to receive these views, to know what they are and to accommodate them insofar as possible. We are equally obligated to provide information to those who express these views, so that they can understand our activities and responsibilities.
>
> 'Our relationship with the American public requires a continuing dialog; without it, we cannot know the public interest. Without such knowledge, the projects that we build are not likely to serve that interest.

"To ensure that we do respond to the public interest, we must seek out its expressions. This is not merely a matter of meeting others half-way; we must do whatever is necessary to obtain the wide range of views which make up the public interest. These often divergent views must be injected into every aspect of our work. They must be introduced during the earliest stage of our consideration of a project and reconsidered at every subsequent stage.

"Among the most important of the views we must obtain and consider are those concerned with environmental values. Altogether too often the environmental viewpoint has not crystallized until a project was under construction. This is not good for those concerned with the environment--their intentions are not realized; it is not good for the Corps--we do not achieve our objectives; it is not good for the American people--their best interests are not served. For these reasons we must take positive measures to insure that considerations of all elements of the public interest, including the environmental viewpoint, are introduced into each phase of our programs."

To correct this deficiency, the Commission recommends that the Corps' St. Paul District Engineer schedule at least one public meeting in each State (Minnesota, Wisconsin and Iowa) on the final EIS. This would be consistent with the Corps' Rock Island District schedule of four public hearings on its draft EIS for the same project.

3. In general, the draft EIS indicates that the St. Paul District of the Corps assumes the inevitable necessity of continuing to operate and maintain the 9-foot channel system essentially as it is now doing. This assumption severely limits the evaluation of all reasonable alternatives by decision-makers, particularly the Congress. The mere fact that the 9-foot channel project was authorized 44 years ago and has been operated and maintained for about 35 years is not sufficient reason to neglect the full range of alternatives. The presentation of the action to continue O & M of this project as though such a decision has already been made is contrary to the basic purpose of NEPA. It should be presented as a proposed action. Sec. 1500.7(a) of CEQ Guidelines specifies that "agencies should keep in mind that such statements are to serve as the means of assessing the environmental impact of proposed agency actions, rather than as a justification for decisions already made." Since the Congress is the public body responsible for the original authorization and annual funding of the project, it should be granted the opportunity to judge the propriety of the action independent of agency presumptions and in light of all the evidence presented in an EIS. CEQ Guidelines, Sec. 1500.13 further states, "It is also important in further action (on existing projects) that account be taken of environmental consequences not fully evaluated at the outset of the project or program."

The final EIS should clearly state the environmental, social and economic impacts of the alternative, "Cease Operation and Maintenance of Navigation Channel," in realistic terms. NEPA requires a thorough discussion of this so-called "no action" alternative: this was not done in the draft EIS. The effects of this alternative should be quantified. Examples of the types of information lacking in the draft which need to be included in the final EIS to balance such a discussion are:

a. acknowledgement and description of existing alternative transportation modes, such as the railroads and highways which parallel the 9-foot channel in the river corridor and the major transcontinental pipelines serving the same markets as the waterway, together with analyses of their capabilities to handle the commodities shipped by waterway and the environmental impacts of their operation, maintenance and use as compared with the waterway;

b. a comparison of the true cost, including original capital investment and the nearly $7 million current annual public expenditure for 9-foot channel O & M in the St. Paul District, of moving goods and commodities by barge on the segment of the river covered by this EIS, with the true cost of moving them via other modes serving the same area; (this is essential to the realistic evaluation of the total economic impact of the project since the commercial waterway users, for whose traffic the project was built and is maintained, now pay no fees to cover the costs of providing the transportation artery they use);

c. an analysis of the actual energy requirements for shipments by waterway, rail, pipeline, trucks and air within the area directly served by the St. Paul District portion of the 9-foot channel project, rather than by citation of data based upon national averages or questionable studies, as was done in the draft EIS. (Our analysis shows, for example, that when movements by unit train on railroads with little or no grade, such as those along the river, are compared with like movements by barge requiring maneuvers, stops and starts for lockages, the unit train demonstrated a fuel consumption rate per net ton mile that was about one-half the rate of barge tows on a locking river, rather than 50 percent more than barge tows, as was claimed in the draft EIS. (Source: Federal Railroad Administration Report OE-73-4, November 1973 and Illinois Central Gulf Railroad.)

4. The draft EIS assumes the continuation of O & M for an indefinite period (although the assumed cumulative effects of various alternatives for O & M were calculated on a 50 year basis). The final EIS should include discussions of alternatives which evaluate the impacts of a phase-out of the navigation project when the functional or economic life of the present lock and dam structures is exhausted, as well as the impacts of changing the primary objective to continue O & M under different authority for recreation, fish and wildlife management purposes.

5. The final EIS should be written so as to present a much more balanced appraisal and comparative analysis of all significant environmental, social and economic values associated with the Upper Mississippi River. The draft EIS consistently overstated commercial navigation use and present O & M beneficial factors. It either understated or omitted entirely information of comparable significance relating to recreation, fish and wildlife uses and values. These values are real, they must be quantified as monetary benefits where they are enhanced by the project, or as costs where they are reduced by the project. Where only fragmentary data exists, such as on fishermen observed from locks and dams at 3:00 p.m. or numbers of pleasure boats locked through, the final EIS should estimate the ratio of observed users to total use of pool segments.

6. The draft EIS is burdened with statements which are qualified by such words as "could...may...might...should," etc. This is especially true in the important areas of discussion of the environmental impacts of present O & M and in the appraisal of possible alternatives. The reviewer and decision-maker is disadvantaged by such qualified presentations; they infuse a strong sense of uncertainty into the evaluation process. In most such instances, qualification is either unnecessary or unwarranted. Great care should be taken in the drafting of the final EIS to avoid this practice, where conclusions are based upon accepted facts and effects of actions are clearly evident.

7. The final EIS must be expanded to discuss and evaluate measures which would enhance and restore environmental quality as well as to avoid or minimize adverse environmental consequences. This kind of discussion is mandated for proposed further incremental actions on existing projects by Section 1500.13 of CEQ Guidelines.

8. If it is decided that O & M activities will be continued, the final EIS should fully consider the costs and benefits of all primary alternatives to present O & M practices in comparable terms. It is recommended that alternative plans be presented in the following manner, pool-by-pool as well as for the entire project area:

   a. Status Quo
   b. Unconfined Disposal of Dredge Spoil in Alternative Locations
   c. Confined Disposal of Dredge Spoil in Alternative Locations
   d. Removal of Spoil from the Flood Plain
   e. Sediment Retention in Tributary Watersheds

   Such a discussion should take into account all appropriate costs and benefits for all public purposes. This will require a much more realistic analysis of the potentialities of Plans c and e above than was presented in the draft EIS (see Principal Findings 9 and 10 below).

9. Inadequate consideration was given in the draft EIS to the alternative of Confined Disposal. Several locational alternatives were discussed, i.e., Selective Placement, Remote Disposal, and Central Disposal, but unconfined disposal was assumed in each of those cases. The more basic consideration is the choice between unconfined and confined disposal. Various locations for dredge spoil disposal could be used with either of these methods. Rejection of Confined Disposal as a beneficial alternative because none

of the material dredged...is considered to be polluted" and "no Congressional authorization currently exists is unwarranted. The Chief of Engineers' office acknowledges other reasons for using Confined Disposal of Spoil, including fish and wildlife management and cost savings, and states that the practice is now in effect on more than 200 Corps projects. (Source: Technical Report H-72-8, Chief of Engineers, November 1972)

10. Inadequate consideration was given in the draft EIS to possible methods of retaining sediment within the tributary watersheds. It should be evident to everyone that control of sediment at the source (erosion control) is a most desirable alternative, if feasible, for all public interests associated with the river. The four categories of measures which would serve to retain either suspended sediment or bed load, or both, are:

    a. land treatment (soil conservation practices on individual farms);

    b. channel stabilization in upstream areas (grass waterways, gully control structures and grade stabilization structures);

    c. channel stabilization in main channels of tributary streams (streambank stabilization and grade stabilization structures); and

    d. sediment entrapment (in farm ponds, reservoirs and sedimentation basins).

The effectiveness of these measures on a watershed basis would, of course, depend on the choice of method(s) and the degree of application. It is agreed that land treatment alone would not greatly affect the amount of bed load sediment, i.e., the dredging requirement. However, it would be of great benefit to the preservation of the backwater areas and main pools. Thus, a combination of the above measures would be required to achieve a high degree of control for both types of sediment. This systematic approach could be used either as a primary or complementary method of sediment control. For example, a 50 percent reduction in the delivery of bed load sediment would result in a comparable reduction in dredging requirements. Likewise, a 50 percent reduction in delivery of suspended sediment would double the life of the pools and backwater areas, if other factors remained the same.

The draft EIS gives virtually no specific information on the potential for applying the above measures, except to say that "an accelerated program of such land treatment measures could be effective in reducing sheet erosion in the study area by an estimated 15 to 30 percent." Although the statement is attributed to unnamed Soil Conservation Service representatives, it must be either incorrect or extremely pessimistic. Commonly used land treatment practices are known to reduce sheet erosion at specific locations by 40 to more than 95 percent. (Source: U.S. Agricultural Research Service.) In the drafting process for the final EIS, it is strongly recommended that close coordination be maintained between the Corps and Soil Conservation Service to improve the discussion of this section. It deserves serious evaluation and quantification.

11. Another serious deficiency of the draft EIS which greatly hampered efforts to conduct a truly independent review was the omission of many source references throughout the report. A great number of significant statements, tables of data, charts and other exhibits were presented without citation. We find this circumstance most distrubing. It conflicts with the spirit and intent of NEPA and denies to the reviewer the opportunity to evaluate this highly technical, controversial subject from the broadest possible independent frame of reference. CEQ Guidelines, Sec. 1500.8(b) clearly states:

> "Draft statements should indicate at appropriate points in the text any underlying studies, reports, and other information obtained and considered by the agency in preparing the statement including any cost-benefit analyses prepared by the agency, and reports of consulting agencies under the Fish and Wildlife Coordination Act, 16 U.S.C. 661 et seq., and the National Historic Preservation Act of 1966, 16 U.S.C. 470 et seq., where such consultation has taken place. In the case of documents not likely to be easily accessible (such as internal studies or reports), the agency should indicate how such information may be obtained. If such information is attached to the statement, care should be taken to ensure that the statement remains an essentially self-contained instrument, capable of being understood by the reader without the need for undue cross reference."

The fact that the Corps departed from these requirements and from commonly accepted professional practice in this draft EIS is reason enough for questioning the validity of the report. Of even greater concer, however, is the fact that the Corps was given source references by its consultant in the draft Environmental Assessment, and that the Corps chose to eliminate most such references in the draft EIS. No bibliography was provided to furnish necessary reference information on the few citations that were given as required by Corps' ER1105-2-507, Appendix C(3) and CEQ Guidelines, Sec. 1500.8(a)(1).

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PART III. SPECIFIC COMMENTS (Purpose: To recommend changes which will make the final Environmental Impact Statement a balanced document for decision-making.)

Comment Number	Page No.	SUMMARY
1.	xi-xiii	The SUMMARY should be modified to follow the format specified in APPENDIX I, CEQ GUIDELINES, FEDERAL REGISTER, VOL. 38, NO. 147, August 1, 1973, on the following points: (a) The name, address, and telephone number of the individual at the agency who can be contacted for additional information about the proposed action or the statement should be provided. (b) Under "Description of Major Federal Action," the States particularly affected and the other proposed Federal actions in the area which are discussed in the statement should be indicated. (c) The date the draft and final statements were made available to CEQ and public should be added.
2.	xi(3a)	"Estimates of savings in transportation costs" attributed to the continued O&M of the 9-foot channel project is not a proper subject for this SUMMARY statement on environmental impacts and should be eliminated. (See comment No. 104)
3.	xi(3a)	"Aesthetics of the present river setting and the production of fish and wildlife" are not "dependent upon the continued operation and maintenance of the project" as such. Instead, they are dependent upon the continued existence of the river's present environment which is <u>impacted</u> by the continued O&M, as described in the SUMMARY.
4.	xi(3a)	The placement of maintenance dredge spoil does not inevitably <u>require</u> that "aquatic and semi-aquatic habitats adjacent to the navigation channel be converted to sandy islands..." This erroneously infers that there is no other way to dispose of the spoil, even under present capabilities. Instead, the EIS should acknowledge that the <u>current</u> practice of placing spoil adjacent to the channel <u>causes</u> such habitats to be converted to sandy islands. Such islands do <u>not</u> tend to eventually develop typical bottomland vegetation." (See comments No. 38 and 116)
5.	xi(3a)	Heavy public use for recreation may be applicable to some, but not to all spoil islands.
6.	xi(3a)	Use of spoil sites as wildlife habitat is so limited that we question its inclusion as a summary statement.
7.	xi(3b)	Unavoidable loss of aquatic habitat by present methods of placement is not limited to "areas adjacent to the navigation channel." For example, blockage of flow in backwater areas is frequently influenced directly by initial placement of spoil or by location of spoil piles which later erode and cause blockage. This action reduces the quality of aquatic habitat for a considerable distance from the navigation channel.

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8. xii(3b) Reference to adverse effects on terrestrial vegetation and wildlife should be added.

9. xii(3b) Turbidity caused by dredging also destroys fish eggs or retards their hatching.

10. xii(4c) All "alternative actions" listed are not alternatives. Some are alternatives and others are complementary measures which might reduce adverse impacts.

11. xii(4c) The arrangement of the discussion should be modified as suggested in Principal Finding No. 8, PART II of our comments.

Section 1. DESCRIPTION OF MAJOR FEDERAL ACTION

12. 2 More information on wing dam and closure dam numbers, types, locations, purpose and their effects on operation of 9-foot channel and environmental effects should be presented in this section.

13. 9 Certainly Congress has approved O&M as a function of the project, but the statement should be qualified to avoid any implication that Congress believes past and present O&M practices *per se* are evnironmentally acceptable. It would be appropriate to present a figure here on the total expenditure for O&M to date.

14. 13 The project is officially known as a "9-foot channel." However, it is normally overdredged to 13 feet. Citation should be made in the final EIS of authority to overdredge to this extent.

15. 18 It would be desirable to present FY 1973 costs of operating the Dredge Thompson within the study area (St. Paul District) in terms of annual cost as well as daily cost.

16. 18 There is an apparent discrepency when 17,000 cu.yd./day for Dredge Thompson is multiplied by 210-day normal annual utilization period results in 3,570,000 cu.yd./year on page 20, the report states the dredge moves "approximately 3 million cu.yd./year." This is 19% over annual volume stated and should be explained or rectified.

17. 19 The reason for the 1½ mile limit on the range of dump scow movement from dredge site to disposal site should be explained.

18. 20 What is meant by "adequate depth" and for what use is it considered adequate on the St. Croix River above the 9-foot channel?

19. 20 Using all daily cost considerations given for the Dredge Thompson, total cost per cu. yd. based on 3,000,000 cu/yd/yr, is 38¢ cu. yd. rather than either 28.6¢ or 32.7¢ given in the report. This seems to be an important discrepency which deserves explanation.

20. 21 Why use 1972 costs for Derrick Barge Hauser if they are not typical? What factors allowed for the lower-cost operation in 1972?

21. 23-24 The tone of the discussion on Corps coordination of spoil disposal plans with "conservation and environmental interests" implies by omission that there is either no coordination with "navigation interests," or that the Corps is the public representative of "navigation interests." Our Commission has always assumed that the Corps is a public agency responsible for the "public interest" in

its broadest sense and that it should not approach coordination responsibilities as though they are an adversary proceeding. Further, since the annual dredge spoil conference "to coordinate dredge disposal with concerned conservation and environmental agencies" is mentioned, it would be desirable to describe the purpose of the annual meeting between the Corps and "navigation interests" on O&M matters.

Also, the representation of "fish and wildlife, recreation, State and Federal interests" as the only parties having "conflicting desires" among themselves is unfair in that it omits the "navigation interests," thus inferring that the latter are not involved in the "conflict of interest" situation.

The citation of increasing difficulty of coordination caused by requests for "disposal in a manner beyond plant capabilities" infers that expansion of plant capabilities is not feasible. This is true only if Congress would not authorize and fund such expansion.

22. 24 A serious information gap hampering proper evaluation of the effects of all dredge spoil disposal on the resources of the study area is noted in trying to analyze the cut and disposal site maps in Exhibits 32 through 42. These exhibits are incomplete since they show only those cut and spoil placement areas affected from 1956 through 1972, or for only 17 years of the 36-year history of the project. This presentation is especially dificient when one considers that, according to the figures provided in Exhibit 56, 64.4% of the total O&M dredging of the project (by volume) occurred prior to 1956. If there are records available on such sites prior to 1956, they should definitely be provided in the final EIS. If there are no such records, the Corps should explain why.

23. 35 The final EIS should clarify the inferred relationship of the installation of 9-foot channel works to the summer stagnation and fish kill effects cited.

24. 35-36 It would be helpful to show in a map exhibit the location of the dam alterations made to improve water quality by restoration of backwater flows, and of the channels and backwater areas which benefited from these modifications.

25. 42 Why are details of maintenance dredging of privately-owned or non-Federal harbors "not readily available" when the Corps was presumably the agency responsible for issuing permits for such activities? The statement that construction of the commercial and small boat harbors listed here "is a direct result of construction of the 9-foot channel project" is speculative. Many of these harbors, especially recreational harbors, might have been built on a 6-foot channel.

26. 47 The statement that the Upper Mississippi River Wildlife and Fish Refuge "became a reality to a large degree as a result of the 9-foot channel project" is somewhat misleading. It would be more accurate to say that the character of the Refuge was significantly altered by the advent of the 9-foot channel project, since the Refuge had already been in existence at least 10 years before the 9-foot channel project was completed.

27. 47-48 To say that 'fish and wildlife interests' allege that Corps O&M activities are adversely affecting only the continued improvement of the refuge' is incomplete, the statement fails to reflect their widespread concern that serious degradation of the refuge is also resulting from such activities.

28. 48 There should be a discussion of the Lower St. Croix Wild and Scenic Riverway project in this section.

Section 2. ENVIRONMENTAL SETTING

29. 50 Citation of Mississippi-Minnesota Rivers junction is out of sequence.

30. 75 Another adverse ecological impact is destruction, or inhibited hatching success, of fish eggs. (See Comment No. 9)

31. 76 It would be appropriate to acknowledge that downstream tributary watersheds in the study area have unusually high sediment yield rates due to a combination of erodable soil, agricultural uses and topography.

32. 79 The statement accurately indicates the major source of sediment is sheet erosion; the sediment carrying capacity of the river has been reduced by 9-foot channel locks and dams: this increased deposition of finer sediments, which, prior to the 9-foot project, may have remained in suspension are likely to precipitate out in the flood-plain and quiet backwater areas. Acknowledgement of the process in the context of the fact that sheet erosion is the primary source of sediment in the river system points up the need for a much fuller final EIS evaluation of erosion control measures within tributary watersheds than has been made in this draft, even though it might not have that much effect on dredging of the navigation channel.

33. 80 The "intended canalization effect" implies an objective of creating a canal for navigation segregated from the rest of the natural river environment. Such a policy would systematically severely damage, if not eliminate, thousands of acres of valuable riverine environment by closing off extensive off-channel areas (as has already happened in the Lower Missouri River). This effect, attributed in the statement to wing and closing dams, is being compounded by the present O&M practice of linear placement of dredge spoil materials along the navigation channel and between wing dams in many areas. Continuation of such a policy would be contrary to the intent of Congress under NEPA, demonstrating the need to modify O&M procedures.

34. 84 (Item b.) As the backwater areas become more and more isolated from the main river, the "detention time' increases, allowing more time for finer sediments to deposit. Thus, even the very fine sediments passing through Lake Pepin are likely to deposit in the more isolated downstream backwater areas in the future. Based on calculations using the figures given in Exhibit 66 for pools 2, 3 and 4 above the outlet of Lake Pepin, there appears to be an average annual outflow from Lake Pepin of over 350,000 tons (11%) of the fine sediments, which would have a significant impact on downstream areas. The draft said this 'wash load...should cause little or no problems."

35. 85 (Item d) The Mississippi River is not at "near equilibrium" unless the dredging operation is considered part of the natural stream situation. Suggest changing first half of second sentence to "If the channel dimensions are maintained so as to be basically the same from year to year,---"

36. 93 We question the assumptions regarding Exhibit 76 on the dredging trend in the St. Paul District. It appears that much of the high-volume dredging in the 1930's would have to have been associated with original development of the 9-foot channel rather than O & M, and that a significant amount of the dredging volume in recent years was due to overdepth dredging to 11- and 13-foot depths to accommodate larger towboats and to allow for less frequent dredging. It would be more accurate to label the section "Dredging Trends" since "Trends" suggests a discussion of natural sedimentation trends.

37. 96 The average reader would find use of common names of plants and trees in Exhibits 78 - 83 much more meaningful than scientific names. (See Exhibit 84 as example). It would help to group species by families in Exhibit 79 to parallel the reference in the text.

38. 103 Inference that "terrestrial vegetation has not changed significantly" is improper. Several thousand acres of bottomland habitat have given way to spoil areas which are being revegetated largely by species adapted to spoil conditions. (See Comment No. 116)

39. 106 While it is true that an increase in island formation and expansion of terrestrial habitat have occurred due to wing and closing dam effects, the corresponding reduction of open water, marshes and wooded swampland habitat should be acknowledged in this section. Cattail is not a common species of deep marshes.

40. 110-116 Extensive use of Dr. Green's paper to characterize ecological changes since inception of the 9-foot channel is inappropriate. His work was published in 1960 and his reporting reflected conditions through 1954, making it 20 years old. This information is too outdated to fairly represent today's situation.

41. 116-148 To provide for better comparative analysis of activities and values with other uses, all references to harvests or catch of mammals, birds, reptiles, amphibians, fish and aquatic invertebrates should be presented and summarized in the socio-economic setting area of the report, not as fragmented citations in the Biological Aspects of the Study Area. Such information should be updated and expanded to more fully represent current values.

42. 121 Passing reference is made to the "national and international significance" of the Mississippi River for migratory birds. This section deserves to be greatly expanded to quantify such significance in national and international terms, especially as regards waterfowl. This section should be coordinated with the Bureau of Sport Fisheries and Wildlife in view of its refuge knowledge and responsibilities and should include the same kind of data available in Appendix B of the St. Paul District Master Recreation Plan, Part I (1965), e.g. 14,931,000 Duck Use Days, 1957-1961.

43. 123 Geese in the Mississippi flyway are responding to both Horicon and Necedah National Wildlife Refuges in Wisconsin. Rend Lake should be added to the southern Illinois refuge list.

To avoid possible understatement, it should be noted that recorded members of nesting ducks are based on actual observation and the total nesting population is certainly much higher.

44. 125 Hungarian partridge are also found on agricultural lands. Woodcock use the valley extensively during their migrations and nest primarily in moist, wooded uplands.

45. 128 Since the statement notes "26 kinds of ducks" in pool 3, the references to "a few waterfowl species" are understated and should be changed to "numerous waterfowl species".

46. 130 Deterioration of vegetation, especially wild celery, has been great in some pools; this influenced pool usage by some diving ducks as well as dabblers.

47. 131 Snapping turtles, soft shelled turtles, and bullfrogs should be mentioned as species which are locally important along the lower pools, and commonly captured for use as food.

48. 132 The American eel (Anguilla rostrata), once common as far up-river as St. Anthony Falls, is now considered rare. Eddy in Northern Fishes attributes their decline to the effects of locks and dams.

49. 134 While wing dams and riprapping have added to rock surfaces and provided feeding grounds for several game fish species, it should be noted that they have tended to concentrate fish in the remaining water areas, with total numbers declining in some sectors due to loss of habitat from extensive sedimentation between the wing dams.

50. 135 It would be worth noting that the elimination of the Skipjack was followed by the disappearance of the Niggerhead clam which depended on Skipjack for survival.

51. 142 Acknowledgement that "the constant loss of silted areas due to the encroachment of sand is reducing the populations of burrowing Mayflies" should also include a reference citing the heavy dependence of fish on these organisms for food supply. As the Mayfly population declines, corresponding declines in fish population can also be expected.

52. 145 Canvasbacks also feed on fingernail clams.

53. 169 The zone of influence of the river is understated. 1967-68 Sport Fishery Surveys of the Upper Mississippi River Conservation Committe show, for example, that nearly one-fourth of the anglers interviewed in pool 7 traveled over 150 miles. A significant number travel for river trips of considerably more than one day for such unique experiences as river recreation by rented houseboat.

54. 170 Exhibit 103 used same projected 2020 population figure for both Hastings and Hudson. Hudson should be much less than stated.

55. 171 Pierce County actually has much less land area of 12% or greater slope than downstream counties. Picture cutline should cite need for good soil conservation practices to control soil losses in all river counties covered by the statement.

56. 172 Statement of causes of land erosion is strong supporting evidence of need for erosion and sedimentation control in uplands to avoid compounding Mississippi River management and ecological problems.

The statement is generally deficient in clearly describing the total picture of lands and water acreages a better breakdown is needed of total project acreages as to all water, all lands, public lands, private lands, Corps-administered water and lands, Bureau of Sport Fisheries and Wildlife-administered waters and lands, etc.

57. 173 Attractiveness of the refuge for such non-consumptive uses as bird-watching, wildlife photography, etc. should be added.

Interstate and Wm. O'Brien parks in Minnesota, and Interstate park in Wisconsin are not on the 9-foot channel project. No attendance figures are given to indicate importance of the recreational use of the river-oriented parks, even though the Corps' 1965 Master Recreation Plan for the 9-foot channel project (which was obviously used as a basis for this section) contained figures on park visitation. Facilities are available for water-based recreation at O'Brien and the Interstates (which are not on the 9-foot channel) and at Fort Snelling parks. However, all attendance figures and facility descriptions should appear in the recreation discussion, pp. 179-186.

58. 174 Since pre-1940 references to tonnage of waterborne commerce are out of context, both with the 9-foot channel project and with the St. Paul District boundaries, they should not be used. For the sake of simple comparison and continuity, tonnage figures for those years shown on graphs Exhibits 104 and 105 should be sufficient to make the point.

59. 174-178 The purpose of the 9-foot navigation channel project is to provide a means of transporting certain types of commodities and products in interstate commerce. At several points in the statement, the Corps estimates that this waterway project saves between 4.0 and 5.4 mills per ton-mile in shipping costs over the other various least-cost alternatives. However, the draft report virtually ignores the existing alternative transportation systems paralleling and crossing the 9-foot channel. Such a discussion should certainly be a part of the description of the Environmental Setting in the final EIS. For example, for much of its length, the 9-foot channel in the St. Paul District has high-speed, double-track rail lines on both sides of the river. Modern Interstate, Federal and State highways parallel or cross the river throughout the project, as do interstate petroleum pipelines. Although they are not likely to

provide means to handle the kinds of freight now shipped by water, the several airports providing scheduled airline service to the valley should be described since they do serve as a means for people to reach the area for other river uses. (See Principal Finding No. 3a.)

60. 175 'Other Freight represented about one-third of the receipts in the District in 1970, according to the graph in Exhibit 104. Such a large portion of the total traffic should be identified by commodity. Also, assuming that a significant amount of other freight is comprised of sand and gravel, how much, if any, is used to maintain the 9-foot navigation channel?

61. 177 By inferring that farms, factories, storage facilities, and refineries are dependent on river shipping, the statement suggests that such entities would not succeed without commercial river navigation (and future O & M). This is an unsound argument since it presumes that, given equivalent public policy objectives and funding, other means of transport would not be economically feasible. There is no foundation for such a supposition. They are only partially dependent on the 9-foot channel and would not necessarily go out of business if the channel system was phased out sometime in the future for some reason.

62. 178-179 Section on Commercial Fishing and Trapping should be rewritten to more fully represent the significance of the socio-economic impact of this use. As written, it is incomplete and outdated. It fails to consider employment, meaningful value and amount of fish and animals taken over a reasonable period of time (such as latest ten-year averages) and primary species of fish involved, i.e., carp, buffalo, catfish and fresh-water drum. Today's values for beaver and muskrat furs are about twice that represented. Mink and raccoon are not mentioned. Appendix L of Upper Mississippi River Comprehensive Basin Study on Fish and Wildlife has good source material. The 1970-71 value data cited on page 168 of the Pool 5 volume of the Final Environmental Assessment is also more up-to-date that the data used in the draft EIS.

63. 178 The last paragraph on Waterborne Commerce should be rewritten to clarify the meaning of the first sentence, and to quantify the amount of water quality degradation associated with commercial navigation and O&M relative to other pollution sources.

64. 179 A summary statement and data on the 1969 forest management plan for the Upper Mississippi River Wildlife and Fish Refuge should be included in the final EIS, with figures showing estimated acreages, board feet and cords. Such information was available in the Environmental Assessment, but derserves reference in the EIS.

65. 180 Fishing and hunting are discussed here as though they are classified as a part of present-day recreational activity. While they really should be so considered, the BOR tabulations do not include them. The final EIS should acknowledge this distinction. Also, more recent data on demand for outdoor recreation in the basin should be used.

66. 180 A general comment on the unrealized potential for hunting and fishing due to effects of both the 9-foot channel project and industrialization (as in paragraph 2 on p. 223) should be included in the District-wide discussion of the subject. It should be acknowledged that Exhibit 108 does not include fishing and hunting.

67. 182 The sentence, The study area contains about 70 percent of the inventoried acreage, should be clarified to define the "study area" involved. (Surely the 9-foot channel project in the St. Paul District does not make up 70 percent of the inventoried recreation acreage in the Upper Basin.) Also, the extent of the area which includes Minneapolis and St. Paul" should be described. As written, it might be interpreted as being only the seven-county Metropolitan area rather than the 19,100 sq. mile headwaters area of the basin.

68. 182 We recognize the apparent lack of data on the total amount of recreational boating use of the navigation pools. However, some attempt should be made to quantify the true extent of this use other than by pleasure boat lockage figures. These are a poor measure of boating use because:

(a) they represent only numbers of craft and do not account for the great numbers of persons involved in watercraft use.

(b) a great number of recreational craft are not accounted for in such figures because they do not go through locks; either their range of recreational interest is wholly within one pool, or the lengthy waiting time required for locking commercial barge tows discourages inter-pool movements (as noted on pp. 231-232 of draft statement); and

(c) to the extent that recreational lockages might provide some indication of the growth of river use for recreational boating, there is no reference in the statement text on the overall increase in recreational traffic indicated by increases in number of pleasure craft locked through as there is in terms of commercial waterborne traffic (as on p. 176); commercial traffic was said to have "about doubled" in the District from 1962 to 1971, so a similar summary statement for pleasure craft use is in order for the final EIS.

69. 185-186 The very limited discussion of sport fishing and hunting activities inaccurately implies that they constitute relatively minor uses of the river. The statement apologizes for the lack of "precise measures of the number of sport fishermen using each specific pool. However, to use the once-a-day count of fishermen seen from locks and dams by Corps personnel as the basic data is misleading as to the true extent of this activity. For example, in Pool 4 the number of fishermen observed from Lock and Dam 3 (most of whom would have been in Pool 4 below the dam) was 2,596, while the total visitation for fishing in Pool 4 for the same year was estimated (in Exhibit 136) to be 169,200, or 66 times as great as the principal data offered. A similar serious understatement of hunting activity should be corrected. The statement cites only the figures for 10-year average annual estimates of 12,035 hunters in Pools 4, 5, 5A and 6 to show the significance of this "major activity." Using figures from both the statement and the assessment, a much more significant estimate of 65,900 hunters in Pools 3 through 10 should be used. Hunting of other game, such as deer, woodcock, etc., should also be mentioned.

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70. 186-263 Information for comparative analyses of factors in each navigation pool would be improved by adding the following to the text for each:
(a) percentage increase in recreational lockage counts, as was done with commercial lockages;
(b) dollar value data for commercial fish catch;
(c) use estimates for fishing, hunting and other recreational activities in terms of annual visitation or user days;
(d) estimates of forest product acreages and values.

71. 210 Reference should be made in Recreation section acknowledging that the St. Croix portion of the 9-foot channel project is a State-administered portion of the National Wild and Scenic Rivers system under P. L. 92-560 and P. L. 90-542. The former Act provides that the statutory authority of the Corps for maintenance of navigation improvements is not impaired by the designation.

72. 210-211 Studies more recent that the Minnesota Department of Natural Resources report give a more accurate picture of recreational use of the Lower St. Croix River. The Minnesota-Wisconsin Boundary Area Commission conducted watercraft use surveys during the summer months of 1970, 1971 and 1972. The Commission found that pleasure boating is by far the most popular use of the Lower St. Croix, with an average of 80,000 boat trips annually involving nearly 250,000 persons annually for an average of 7.6 hours per trip. This amounts to over 600,000 boat-hours of boating. The Commission also estimated at least 15,450 man-hours of water skiing, and about 8,800 camp nights of camping. Considering state and local park use as well as watercraft use and fishing use, there are well over 1½ million recreational visits to the Lower St. Croix River annually.

73. 211 The 100 "out-of-state" fishermen were from states other than Minnesota and Wisconsin. Two new state parks, Afton (Minnesota) and Kinnickinnic (Wisconsin), are being developed on Lake St. Croix.

74. 214 About 80 percent of the boaters mooring recreational craft at Hastings and Prescott in pool 3 are regular users of Lake St. Croix, not Lake Pepin. Recreational demand associated with Chicago is certainly not significant in pool 3; this would be more likely to be true for pools 7 through 10 in the District.

75. 217 Since hunting is considered to be "the most popular productive type of sport" in pool 3, figures should be in the text showing estimated number of hunters and harvested waterfowl.

76. 222 Figure of 100,000 people in pool 4 zone of influence inconsistent with 150,000 figure on page 218.

77. 222 There seems to be a great discrepancy between figures showing estimated number of recreational visits to pools 4, 5, 5A and 6 for 1971 (Exhibit 137) and the total visitation figures in pools 4, 5A and 6 for 1963 (Exhibits 136, 147 and 152); it appears that there was 3 to 4 times as much recreational activity in 19[illegible]. Only the most applicable figures should be used.

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78.	223	Second paragraph should appear in general discussion of entire District on page 190. (See Comment No. 66)
79.	228	Reasons for the marked decline in number of fish caught in pool 5 should be offered. It is probable that the closure of backwater areas for spawning and rearing and disturbance of fish habitat in general are logical reasons for decline in fishing success in this pool.
80..	229	Weaver Bottoms is an extensive and controversial area in pool 5 and should be mentioned as a major fur-bearer and waterfowl habitat that is on the decline (as noted on p. 295).
81.	240	Information on trapping should be presented for pools 7 - 10. Hunting figures are lacking for pool 7.
82.	250	Inclusion of information on agriculture in pool 9 discription is useful, similar information would enhance understanding of other pools.
83.	256	To be consistent with other pools, figures for pleasure boat lockages in pools 8 and 9 should be calculated from 1960 rather than from 1954.
84.	257	The more recent data in Table 36 of the Environmental Assessment report for hunting in pool 9 should be used. It shows an estimated 15,205 hunters in 1971 rather than the 5,375 used in the statement.
85.	260	Change figure 3,300 to 5,500 for boats locking through Lock 9 in 1972.
86.	263	Hunting figures for pool 10 should be updated; the 9,000 figure used is in Exhibit 172, not 165.
87.	263	The second opening paragraph in the Summary of Major Beneficial and Adverse Impacts of the 9-foot channel project is oversimplified and seriously unbalanced. Any such summarization should at least acknowledge the major beneficial and adverse impacts cited in the discussion which follows it: e.g., the project impoundments increased the rate of accumulation of sand and silt in the flood-plain; decreased oxygen concentration in backwater sloughs; altered river flow patterns; increased aquatic environment, etc.
88.	263	Impact of the 9-foot channel project impoundments on the rate of accumulation of sand and silt in the floodplain has been substantial. The word "somewhat" is inappropriate and meaningless.
89.	264	It is surprising to note that "there are no scientific estimates available" as to how long it will be before "the sediment level eventually reaches the crests of the spillways of the dams." Sedimentation rates are one of the key factors considered in Corps impoundment projects throughout the country. This is clearly an area that deserves to be analyzed and reported in an EIS.

90.	263-264	The statement should be more specific in its discussion of project impacts on terrestrial and aquatic areas. For example, the Environmental Assessment Reports for pool 7 (Table 5) and pool 8 (Table 4) show acreages of ecotypes prior to and after closure of Dams 7 and 8 respectively. These give a real measure of the environmental effects of the project and allow decision-makers to measure and evaluate the trend of changes in habitat base resulting from continued O & M. Such information should be included in the EIS for each component of the system.
91.	266	Conversely, terrestrial wild animal populations in the area were reduced by the project due to large-scale elimination of floodplain habitat by impoundments.
92.	266	While stabilization of water levels by project impoundments made fish rescue work in isolated floodplain pools "unnecessary," it should be pointed out that many such problem areas were probably cut off by earlier channel modification works such as wing dams and closing dams.
93.	266	The statement that "wing dams effectively increase the total area of river bottom for invertebrate production" is accurate only where such structures are not subject to heavy sedimentation. As the EIS points out (P. 80), there has been considerable sedimentation between and behind wing dams and closing dams. The long-term cumulative effect of such sedimentation is to reduce habitat rather than increase it.
94.	268	Another paragraph is needed on effects of closing of chutes and backwaters. The discussion of conditions unsuitable for fish on page 265 more properly belongs in this section.
95.	268-269	The EIS overstates the beneficial impacts of the project on recreation and aesthetics. Sand beaches created by dredge spoil deposition for miles along the main channel may be "beautiful" for certain purposes, but to many people who place high values on natural environmental settings, they represent an artificial scar on the riverscape. As the discussion of the impacts of spoil vegetation states on p. 367, "the unnatural appearance of unvegetated, linear, continuous spoil deposits bordering the navigation channel could be eliminated.
		Citations of the provision of boat launching facilities, scenic areas and observation platforms "incidental to the navigation project" and of the "Master Recreation Plan for the Project" are valid, but the public should know that Corps operation and maintenance of public recreation facilities in the 242.5 miles of rivers in the St. Paul District of the project constitutes only 1 percent of the annual Corps District budget, or about $65,000 in Fiscal Year 1974. Reference to the invention of water skiing "on post-impoundment Lake Pepin" should be eliminated; such a claim more properly belongs to the originator of the activity and should be left to the promotional literature of the Lake City Chamber of Commerce.

Under adverse impacts, the aesthetic appeal of the riverscape has, indeed, been "locally reduced due to urban development of riverbank property;" but it should be noted that a significant amount of this development was attracted to the riverfront by the navigation project. Also, dredge spoil from the project has reduced the aesthetic appeal, as was previously noted. In terms of the impact on recreational boating, it should be noted that the installation of the locks and dams of the project serve as barriers to free movement of watercraft on the river. Because of time-delays often encountered at locks due to commercial tow operations, many users are effectively forced to confine their recreational boating use to a single pool. This factor is a contraint on the public's enjoyment of the full range of river recreational opportunities.

96. 270 The second paragraph on "Impacts on Land Use" belongs in the discussion on surface water. The existence of the project has also created problems of law enforcement on the river in areas where channel modification has changed the main thread of the stream. For many miles, the "main channel" no longer follows the natural course which is the legal interstate boundary line.

The introductory summary paragraph (p. 263) cites "shaping of urban growth...to take advantage of...navigation potentials..." as a social impact of the project. Since "increased development of commercial docks and industrial complexes along the river" is cited as an economic impact (p. 271), one of the major land use impacts not mentioned is the attraction of such facilities to riverbank lands by the project. It would also be fair to point out that many such developments are also damaged by flooding, a factor which is the reverse of the situation cited regarding removal of farming operations from "a high risk flood area." There is usually a public cost involved in either protecting or rehabilitating these flood prone facilities.

Dedication of bottomlands has assured their preservation as a haven for wildlife (but not fishes) to some extent; however, dredge spoil deposition from the project is having an adverse impact on many such lands (as noted on pp. 308-312). This inconsistency within the report should be balanced by expanding the statement.

97. 271 The Section on Economic Impacts is inadequate even as a summary statement. Economic benefits listed are not quantified. Economic costs in terms of first costs of building the 9-foot channel system and continuing costs for O & M are not given. Although tonnage figures for 1971 cargo movements (why not 1972 as on pp. 176 and 277?) are given, no estimate is made of the value of cargo shipped on the waterway. Also, no reference is made to the obvious economic impacts of the project, both positive and negative, on other competing modes of transportation. Economic costs and benefits related to impacts of the project on fish, wildlife and recreational uses are not mentioned. These deficiencies should be corrected in the final EIS.

98. 272 The statement apparently assumes that cessation of O & M of the locks and dams and channel for commercial waterborne transportation would automatically preclude O & M for any other purpose. In our view, this is not a fair assumption since it ignores the possibility of operating and maintaining such facilities for fish and wildlife and recreational purposes. Congress would have to change the primary objectives of the project in order to establish this alternative (as noted on page 336 of the EIS).

Congress is the governing body responsible for (a) authorizing the development of the 9-foot channel project, (b) authorizing public investments in the continued operation and maintenance of the projects, (c) establishment of the present Federal Fish and Wildlife Management objectives in the Upper Mississippi River Corridor, and (d) the establishment of procedures (under NEPA) for identifying, quantifying and evaluating the environmental impacts and alternatives relative to major Federal actions significantly affecting the quality of the human environment, which is the purpose of the EIS.

Therefore, we believe that the authority and responsibility for considering whether or not it is reasonable to operate and maintain the present 9-foot channel navigation project for other public purposes belongs to Congress rather than to the Corps of Engineers. The Corps has a responsibility, in this case, to at least acknowledge the possibility of such a change in primary objectives, to quantify the alternative in a meaningful way which allows for independent evaluation by others, and to fully and objectively disclose any advantages and disadvantages applicable to such a potentiality. Such a discussion would likely reveal, for example, that most of the beneficial impacts of the project would be retained while most of the environmentally and socially adverse impacts would be substantially reduced or eliminated.

The draft statement properly acknowledges that the rate of sedimentation in backwater areas would be reduced by suspension of dredging. While some dredging would probably be necessary to maintain a safe channel for recreational boating, the volume of dredge spoil would be only a fraction, perhaps one-third, of the present amount since the channel would be maintained at substantially less than the present 300-foot width and 11- to 13-foot depth standards. This would result in either a net reduction in dredging costs or an opportunity to use more time-consuming spoil disposal methods that are less environmentally destructive than present methods, or both.

There would undoubtedly be less damage and wear and tear on lock structures than is now caused by the large, heavy barge tows. Overall, the environmental damages and system O & M costs would be substantially reduced. Such an alternative, though it may seem unrealistic under present Congressional policy, is reasonable for discussion purposes. (See Principal Finding No. 4)

99. 275 Comments on the factors which "need to be considered in evaluating the present transportation system:"

(Item d.) We question the assumption that railroads consume more energy than barge tows to move an equal volume an equal distance under all conditions. (See Comment No. 101)

(add Item g.) The possible effects of imposing user fees on waterway carriers to help defray O & M costs of the navigation project.

(add Item h.) The transit time and possible point-to-point delivery advantages of rail over barge.

(add Item i.) The comparative O & M impacts of the two modes on the natural resources of the nation.

100. 275 Another notable example of "new problems since the 1930's controversy" is the recent increased emphasis on environmental protection, pollution control and social well-being.

101. 276 Because nature does not provide uniform conditions in all parts of the country, the argument that waterways inherently require less energy to move freight than any other mode is very much open to question. The final EIS should not use the Rand study cited in the draft for comparison of energy requirements for waterway movements on a "locking river." (The Rand study has since been updated, showing a less favorable ratio for waterways.) Even the "apparently conflicting" study from "Railway Age," cited on page 283, involved 17 railroads involving all kinds of freight at various speeds over all types of terrain. The only valid analysis for the Upper Mississippi River 9-foot channel project would be a comparison of energy consumption of movements on the Upper Mississippi with that of similar cargo movements by other modes under conditons typical of the Upper Mississippi region. It is recommended that such an approach be taken in the final EIS (See Principal Finding No. 3c)

102. 277 Since much of the rail shipment of coal and grain is being handled in 100-ton cars now, the "50-ton average" figure is too low; 75 tons-per-carload is more realistic. Thus, to move the estimated tonnage hauled on the 9-foot channel in the St. Paul District in 1972, it would theoretically take about 218,000 railroad carloads in 2,180 trains of 100 cars each, or something less than six trains daily for a year. If the cars and locomotives were available (we have not checked their availablity), the existing railroad system in the Upper Mississippi valley region probably could handle the increase in traffic. The final EIS should comment on this capability. (See Principal Finding No. 3a.)

103. 278 The final EIS should acknowledge that the "estimated savings in transportation costs (by waterway shipments) over the other various least-cost alternatives" are:

(a) made possible largely because historically waterway shippers have paid no tolls or fuel taxes to help maintain the system designed and built for their shipments;

(b) offset by the overall cost (first cost, O & M cost and replacement cost) of providing the waterway transportation system at taxpayer expense,

(c) based upon a study done to evaluate the economic feasibility of replacing Locks and Dam 26 of the Upper Mississippi River 9-foot channel project, but which handles traffic for both the Upper Mississippi and Illinois waterways. The final EIS should discuss the true cost of the system and estimate any savings resulting from waterway shipping in terms of dollars per year, both for the St. Paul District portion of the river, and for the Upper Mississippi River as a whole. (See Principal Finding No. 3b and Comment No. 2)

104, Omitted

105. 279 "Future expansion of the barging traffic," due to opening of strip mines for coal production in the West, is much more speculative than presented. The final EIS should deal with the subject only as "a possibility."

106. 279-282 Presentation of quotes from letters from waterway users which "will suggest the strength of their argument in favor of continued operation and maintenance of the 9-foot channel," is improper. Such communications seek to justify the continuation of the major Federal action. They belong in the discussion on comments and warrant the same treatment as that which the Corps plans to give to the comments of any agency, organization or industry on the proposed action. Inclusion of such material within the draft EIS text creates serious imbalance in the statement.

107. 283 The "Railway Age" discussion of energy use in transportation is badly misplaced; it should have been presented alongside the Rand Corporation study findings on page 276 under "Barge Transportation and Energy Use" rather than as an afterthought under "Barge Transportation and Cost Savings."

108. 283 Discussion of "the inter-relations of projects..in operation by any agency or organization" (Corps ER 1105-2-507, Appendix C, Sec. 4b), as it pertains to the obviously major function of the Bureau of Sport Fisheries and Wildlife's National Refuge, is very inadequate in this section. The statement should indicate how much of the 106,197 acres of land made available to the Bureau through the Corps' 9-foot channel project are lands submerged by waters of the navigation pools. On page 47, the statement is made that "a considerable portion of the 113,366 acres of Federally-owned land in the various pools lies below normal pool levels." It should also be noted that the maintenance and patrolling of most Federal lands in the pools is handled by the Bureau of Sport Fisheries and Wildlife.

Reference should be made to the BSF & W's goals and policies for administration, zoning and management of refuge lands as set forth in the conceptual plan entitled "A Plan for Upper Mississippi River Wildlife and Fish Refuge" (September, 1968). Incidentally, the draft EIS heading incorrectly identifies this project as the "Upper Mississippi Fish and Wildlife Refuge." Also, the refuge is managed for wildlife and fish resources.

109. 284 The section on the Great River Road should acknowledge that Congress authorized the appropriation of a total of $90 million "for construction or reconstruction of the Great River Road" in Section 148 of the Federal-Aid Highway Act of 1973. This represents yet another Congressional recognition of the values of the river corridor for public enjoyment of scenic beauty and for public use as a recreational resource.

110. 285 Since the title of the National Recreation Area bill is given, the much more useful reference, HR 11603, should also be cited.

111. 289 The discussion of the interrelationship between the O & M of the St. Paul and Rock Island Districts should be expanded to acknowledge that the maintenance dredging capability and practices (such as overdepth dredging to 13-foot depths) in the St. Paul District are influenced by the fact that the Dredge Thompson is assigned to work in both districts. There should also be a simple description of the Rock Island District portion of the 9-foot channel project (number of pools, length in miles, annual tonnage, etc.).

112. 289 The final EIS should certainly include a discussion of the Lower St. Croix National Scenic Riverway as designated in the Lower St. Croix River Act of 1972 (PL 92-560). How this highly-publicized project of the Department of the Interior and the States of Wisconsin and Minnesota could have been overlooked in the preparation of the draft EIS is puzzling, especially since there is a direct interrelationship between it and the 9-foot channel on the St. Croix River. A Master Plan is being prepared for the Scenic Riverway which includes the following recommendation: "A spoil disposal plan should be developed so that dredge spoil material from the 9-foot channel would be used to supplement existing beach areas or to establish additional recreation sites outside the floodway." It should also be noted that no new commercial or industrial development on the St. Croix River will be permitted unless it is deemed compatible with scenic preservation criteria and standards.

113. 289 Since transportation by water is the main purpose of the project covered by this EIS, a discussion should be added of the St. Lawrence Seaway-Great Lakes water transportation route which is an international transportation system and also a major influence on the same region served by the 9-foot channel. It would seem that many of the same transportation characteristics attributed to waterway shipments on the Upper Mississippi River apply to Great Lakes shipping. Thus, a discussion of comparable factors, such as types of commodities, tonnages, and assumed economic advantages is needed to allow for a basic analysis of the interrelationship between the two waterways.

114. 297 The practice of avoiding "guts" of feeder channels might be true for initial spoil placement, but the practice should also take into account the potential for secondary movement of spoil materials into such areas. For example, problems associated with this kind of action at Crosby Slough (noted on page 306) could be alleviated by taking secondary movement possibilities into account in dredging plans.

115. 305 The statement that "The spoil frequently spreads out into off-channel areas affecting several types of shallow aquatic habitats such as marshes, floodplain lakes and ponds" is so significant that it should be included in the Summary Section of the final EIS. (See Comment No. 7)

116. 307 We seriously question the general classification of vegetation which eventually occupies open sand dredge spoil sites as "typical bottomland vegetation." Moisture factors and sterile environment of spoil sites make natural revegetation difficult and severely limit the establishment of "typical bottomland" species. This is borne out by the EIS itself on page 583.

We also believe that to say that "some 45 percent of the identified spoil deposits are presently vegetated to a significant degree with bottomland woods and brush" is questionable on the basis of the true vegetative types. Natural revegetation is principally limited to willow and cottonwood, with little ground cover and few typical bottomland species. Therefore, even where such vegetation has occurred, it does not represent a true recovery of the natural river environment. (See Comments No. 4 and 38)

117. 321 Even though Gibbs Slough "has never been used as a dredge spoil disposal area," sedimentation has probably been accelerated by slack water impoundment by Dam No. 6.

118. 325-327 The section on Economic Impact of O & M suffers from the same deficiencies as the section on page 271. These deficiencies should be rectified in the final EIS. (See Comment No. 97)

119. 326 By using waterway traffic projections derived in 1964, the suggestions that barge tonnage is expected to double from 1964 to 1980 and triple from 1964 to 2000 appear to be overstatements. Later data, in Table 1 on page 11 of the Corps' Phase I Report on the Mississippi River-Illinois Waterway 12-foot Channel Study (September 1972), indicate that tonnage may double by 1980 for Locks 5 through 10 (but not for Locks 1 through 4); however, tonnage would not be triple the 1964 level until 2020, and then only for Locks 8 through 10. We recommend modification of the EIS on this point, both in the text and in Exhibit 106.

Section 4. UNAVOIDABLE ADVERSE IMPACTS OF OPERATION AND MAINTENANCE

120.	331	References to unfamiliar term "channel border" have been made without definition. (It was ultimately discovered by accident that this and other terms used throughout the statement are described in Exhibit 194 under the obscure title 'Explanation of Impact and Effect Parameters Used on the Alternative Plans Comparison Exhibits.") Recommend that this list be put in the final EIS as a "Glossary."
121.	331	The statement that "maintenance of a navigation channel requires dredging and the disposal of spoil" implies that there are no alternatives available. This ignores the possibility of retention of sediment within the tributary watersheds and, at least, should be qualified to reflect the variations in the amount of dredging which might be necessary under various conditions. We cannot accept the assumption as presented since it infers that it is "unavoidable." (See Principal Finding No. 10)
122.	332	Secondary movement of dredged spoil is cited as an unavoidable adverse impact. This could be avoided by using confined disposal areas, rip-rap, or disposal out of the flood plain in the future.
123.	332	Turbidity created in spoil placement is avoidable by using confined disposal. The final EIS should not draw the conclusion that this disposal technique is too expensive, or biologically and aesthetically unacceptable. This judgment hinders independent judgment and, furthermore, such a practice would not result in "sacrificing the authorized function of the project."

Section 5. ALTERNATIVES

124.	335	Congress has ~~authorized the 9-foot~~ navigation channel, but it also enacted the National Environmental Policy Act of 1969 requiring Environmental Impact Statements to provide a means by which the public, including Congress, can make wise decisions before committing to major actions affecting the human environment. As noted in Principal Finding No. 3 of these comments, the draft EIS assumes that the continuation of O & M on the project is an accepted fact. This is contrary to NEPA and affords the public, including Congress, no opportunity to weigh the "no action" alternative at all. The discussion of the alternative, "Cease All Operation and Maintenance Activities,' should be treated as though continuation of the activity is a proposal. Thus, the alternative becomes a "no action" alternative and should be given the same rigorous examination as any other alternative. All identifiable beneficial and adverse environmental, social and economic effects should be noted and quantified. Such a discussion is essential to the balance of the statement and the fulfillment of NEPA requirements.
125.	335	As noted in comment No. 98, an additional alternative is to operate and manage the dams, pool and locks for various purposes other than commercial navigation. As with (a) and (b), this would be a major change in the primary objective, but certainly more reasonable than (a). (Also see Principal Finding No. 4)

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126. 335 As noted in Principal Finding No. 4 of these comments, it is reasonable to consider an additional alternative which would "Provide a 9-foot Navigation Channel Until the Functional or Economic Life of the Project is Exhausted." Discussion of this alternative would disclose how long the present facilities of the project will be useful, costs to replace obsolete or deteriorated locks and dams, etc. It could also provide a more accurate time-frame for calculation of the cumulative effects of proposed actions under various other alternatives.

127. 336 The controversial nature of potential impacts is not a legitimate reason for considering O & M of a channel other than a 9-foot channel an unreasonable alternative. This should be fully discussed in the final EIS.

128. 337 The discussion of alternatives in terms of "reducing the adverse impacts of existing operation and maintenance" is inadequate. CEQ Guidelines, Sec 1500.13, requires evaluation of ways "to <u>enhance and restore</u> environmental quality as well as to avoid <u>or minimize adverse</u> environmental consequences," specifically on existing projects. The final EIS should be oriented to this broader mandate. (See Principal Finding No. 7)

129. 337-576 The discussion and evaluation of alternative plans in the final EIS should be handled in the manner recommended in Principal Finding No. 8 of these comments.

130. 340 The estimate of a 15 to 30 percent reduction of sheet erosion through the land treatment measures mentioned in this paragraph is too low. Extensive research on soil losses by the Agricultural Research Service shows that the following average reductions in field soil losses are possible:

(a) Contouring--------50%
(b) Strip Cropping----75%
(c) Terracing---------86% to 95%

Therefore, with "an accelerated program of such land treatment measures," an overall reduction in sheet erosion, i.e., production of suspended sediment, on the order of 50 to 75 percent should be possible. Thus, the sediment problem in the Upper Mississippi Valley provides dramatic evidence that the control of sheet erosion is of major benefit to the general public, through reduction of sediment delivery to the Mississippi River. It also provides long-range productivity benefits to the landowners. (See Principal Finding No. 10)

131. 342 The pessimistic statement in the second paragraph that some land treatment measures are prohibitively costly, subject to 'adverse social reaction,' etc., is a very questionable conclusion which requires documentation. Without cost estimates and other information no one outside the Corps can draw an independent conclusion.

132. 342 Grade stabilization structures are intended for stabilization and preservation of gullies in upstream areas, not to "curtail soil losses." Subsoils often contain coarse sediments. (This is acknowledged in the following paragraph.)

133. 343 The same practices that reduce sheet erosion do usually reduce runoff rates significantly for small watersheds.

134. 343 The statement implies that content of suspended sediment in flow significantly affects bedload transport capability; such a cause and effect relationship is highly questionable and requires documentation. It is wrong to say that land treatment will increase channel erosion. This is an unsupported conclusion based on speculative propositions.

135. 344 The statement that reduction in bedload would increase streambank scour applies only if scour extended to greater depths than is now obtained by dredging, or if channel meandering increased.

136. 344 Agree that sedimentation and bank stabilization on tributary streams would be an effective means of reducing the amount of bedload sediments entering the river.

137. 344 The second paragraph, implying that bedload movement in tributary watersheds is already well controlled, except in lower portions of these streams, is very questionable. Specific evidence should be offered.

138. 345 The draft statement tantilizes the decision-makers with the possibility of reducing dredging and its attendant effects in pools 4 (below Lake Pepin), 5 and 5A by stabilization of terraces along the lower Chippewa. Yet the document is silent on the costs and benefits of such a measure. This provides no basis for comparison of this potentially important alternative. This deficiency should be corrected in the final EIS.

139. 346 The first paragraph is unjustifiably pessimistic and presents conclusions not supported by evidence.

140. 346 In the list of potential benefits from land treatment, benefits due to reducing sediment deposition in backwater and main pool areas is not included. This is clearly a major environmental benefit.

141. 346 Since costs or benefits are not quantified, there is no legitimate basis for concluding that savings from a comprehensive watershed land treatment program "might not balance the expenditures that such a program would entail." These kinds of unfounded statements are subsequently used as a basis for arbitrarily dismissing watershed land treatment as a potentially worthwhile measure for arresting sedimentation in pool and backwater areas.

142. 347 The statement that "each use would prefer to have the sedimentation process of the river handled or treated in a different manner" is presumptious and should be eliminated.

143. 348 Assuming that "the river" includes backwater and off-channel areas, the statement that "proper location of wing dams, closing dams, and sediment barriers could be used to reduce the amount of sediment entering the river..." is confusing. To clarify the discussion, it should be noted that the effect of sediment barriers is to reduce sediment inflow to the entire river; the effect of wing dams and closing dams is to direct deposition in the area of the main channel.

144. 348-349 While placement of closing dams "across the feeder channels to the backwater areas to keep the water in the main channel" is probably technically feasible, it is so ecologically irresponsible that it should not even be discussed in the final EIS. It is simply not a reasonable alternative.

145. 350 Third paragraph suggests that a sedimentation basin would not be feasible by saying costs "may" exceed the benefits and "could" cause other problems, without giving cost estimates or other supporting data. Trapping would reduce coarse sediment.

146. 351 The last paragraph gives good arguments for serious consideration of confined disposal. The concept should have been pursued further with estimates of these benefits and the costs.

147. 355 The statement, "a confined site might actually be larger than an unconfined site," would apply only to the above-water portion and only for rather special conditions. In general, confined disposal would take less space, much less if 10-20 feet high.

148. 355 The fine particles are "carried beyond the immediate boundaries of the disposal site, effectively extending the area affected by the dredging operation." On page 316, the draft statement says, "The turbidity generated during maintenance dredging spreads beyond the disposal site...." Also, "use of a confined disposal area would reduce the amount of fine material being carried into backwater areas..." As noted on pages 351-352, "This will permit fine materials to settle out and be retained on-site rather than being discharged into the waters surrounding the site."

149. 357 We question the statement that "none of the material being dredged in operation and maintenance activities of the 9-foot channel is considered to be polluted." There must be areas of bottom sediment in those pools, such as 2, 3 and part of 4, which contain sludge deposits from major oil spills and wastewater discharges. It must also be acknowledged that there are State stream standards setting limits for turbidity and suspended solids which might be applicable to maintenance dredging. In any event, the suggestion that containment facilities are justifiable only in areas where there is dredging of "polluted materials" is a narrow position which distorts the Corps' own acceptance of other valid reasons for considering such a practice, as noted in the November, 1972 Technical Report (H-72-8) released by the Chief of Engineers entitled "Disposal of Dredge Spoil." (See Principal Finding No.9)

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150.	358	Erosion of spoil materials is 'contributing to the partial closure of guts or sloughs feeding fresh water into backwater areas," as noted on page 265.
151.	359	Many of the benefits associated with minimizing secondary movement noted in the discussion of revegetation also apply to confined disposal.
152.	366	Vegetation of spoil sites, if done with species especially selected for recreational purposes, would not necessarily cause "loss of potential recreation sites."
153.	369	If hand sowing of seed is cheaper, it would seem reasonable to use such a method at large as well as small sites.
154.	372	Planned disposal with build-up of sites to "finished dimensions" is cited as a possible worthy measure, it is really a confined disposal technique. Yet, the Corps does not identify confined disposal as an "alternative measure having greatest potential for reducing adverse environmental impacts" in Exhibit 223 for any segment of the river. (See Principal Finding No. 9)
155.	385-386	It would seem that at least part of the cost of handling dredge spoil removed from the floodplain would be offset by monies received through sale of the material for commercial use.
156.	397 and 410-414	The final EIS should discuss what effect the Corps' transfer of the Dredge Rock Island out of the Rock Island District in 1958 has had on the dredging capability and the maintenance dredging requirements within the St. Paul District portion of the 9-foot channel project. We note that overdepth dredging to 13-foot depths is one result, allowing a "cushion" because the Dredge Thompson no longer spends all its time in the St. Paul District. Also, the opportunity to reduce the pumping rate and increase the operating radius of the Dredge by as much as one mile has been inhibited by the transfer of the Rock Island to Mobile Engineer District (as the Dredge Collins). The Corps should comment on the possibility of replacing the Dredge Rock Island as an alternative to expansion of the capabilities of the Dredge Thompson.
157.	415	To say that "few beneficial impacts would result from the increase in plant capability itself" is misleading; the citation of "beneficial ecological and aesthetic impacts" which follows the sentence indicates favorable impact potentials for many areas of the river.
158.	415	It would be worth mentioning why Congress has imposed a moratorium on the purchase of new dredging equipment.
159.	434	Migration of the American eel has been curtailed by locks and dams. (See comment No. 48)

160.	442-446	The commercial use of dredge spoil deserves much broader evaluation and market analysis in the final EIS. Recent publications, such as "Highway News" of the Minnesota Highway Department, cite a growing nationwide shortage of aggregate and sand. Downstream from the St. Paul District, the Mississippi and other rivers are "mined" by commercial operators to obtain such materials.
161.	461-568	"Alternative plans" for each pool should be discussed as recommended in Principal Finding No. 8 of these comments.
162.	488	The "status quo" alternative would be unacceptable on the St. Croix River in the context of its designation as a National Wild and Scenic River. (See Comment No. 112)
163.	494	Item d is very meritorious.
164.	495	We recommend alteration of locking procedures at all locks, but especially Locks 3, 5A and 7, to better serve both barge tows and pleasure craft.
165.	510	Dredge openings of Pool 5 areas mentioned in Item d. are strongly recommended.
166.	533-534	The Pool 7 Assessment Report indicates that 25-30 percent of the volume of Lake Onalaska has been lost through sedimentation in only 26 years. Dredge openings discussed are highly recommended as is the concept of water level change cited in Item f.
167.	572	We believe the Corps has more clear authority than it acknowledges to dredge openings to backwater areas.

Section 6. <u>THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY</u>

168.	580	The movement of all sediments is <u>definitely</u> causing closure of flowing sloughs and the process is <u>not</u> necessarily "unavoidable." It would seem that if the river flow can be directed to follow a navigation channel, it can also be directed to move through flowing sloughs, if it is important enough to the well-being of Man and Nature.

Section 7. <u>IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES</u>

169. 581 The following statement is cited:

> "Habitat losses could be mitigated by commitment of additional resources for restoration. The magnitude of resources required in a restoration effort is usually excessive and, therefore, the effects of environmental degradation are considered irreversible."

The above statement relates to the fundamental question concerning the public commitment to <u>all</u> values associated with the

169. 581 continued Upper Mississippi River, i.e., "Can we as a Nation afford to operate and maintain a commercial waterway and, at the same time and in the same river system, protect and enhance the natural environment of the resource?" Considering the question in the context of the National Environmental Policy Act and the total public interest, it would be more appropriate to ask, "Can we afford not to do both?"

The statement quoted should be left out of the final EIS. It answers the question negatively and is in direct conflict with NEPA and the entire purpose of rational decision-making embodied in the EIS review process.

170. 582 It would be more meaningful to state O & M fuel consumption for dredging in terms of gallons per year; it appears to be more than 250,000 gallons annually.

171. 581-584 Irreversible commitments should be presented in greater detail, as was done in the Environmental Assessment Reports on this proposed action.

Section 8. COORDINATION

172. 585-587 The discussion shows that the Corps did not hold any public hearings on the draft EIS despite the complexity of the statement and widespread public interest in the project. Public hearings on the final EIS are recommended. (See Principal Finding No. 2)

EXHIBITS

In addition to the many suggestions made in the preceding comments, the following recommendations are made for the final EIS:

173. All Exhibits should include source citations and a complete bibliography should be included. (See Principal Finding No. 11)

174. It would be very helpful to include tables showing total usage of the river for various purposes, especially fishing, hunting, recreational uses, etc. This could be done by combining figures for individual pools.

175. Maps would be very useful to the understanding and evaluation of the alternative plans, including possible sites for various disposal areas, land treatment and sediment control structures, stockpile areas, dredge openings to backwater areas, etc.

176. The Federal Court Order issued by Judge James Doyle concerning maintenance dredging in Wisconsin waters of the river should be added.

END OF COMMENTS

6400

STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
CENTENNIAL OFFICE BUILDING • ST. PAUL, MINNESOTA • 55155

May 6, 1974

Col. Rodney E. Cox
District Engineer
U. S. Corps of Engineers
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

The Minnesota Department of Natural Resources has reviewed the Draft Environmental Impact Statement on the Operation and Maintenance of the 9-Foot Navigation Channel on the Upper Mississippi River. We appreciate being given the opportunity to review this document and present herewith our comments.

We recognize the vast amount of effort already demanded from the Corps of Engineers within critical time limits in the preparation of the Draft EIS. We do hope, however, that these comments and suggestions will assist your agency in the preparation of the Final EIS.

GENERAL COMMENTS AND OBSERVATIONS:

We have no comments on Section 1, Description of Major Federal Action.

In Section 2, Environmental Setting, we have several specific comments that are presented subsequently in this letter. Certain of these comments point to the need for further clarification and quantification. Others indicate that more recent data is available and should be used in the formulation of certain conclusions. We have identified these sources of data later in this letter. Other comments include differences in the analyses of the data. In each case, we have attempted to support our viewpoint or conclusion. For your convenience, our comments and suggestions can be related to the corresponding page in the report.

The organization of Sections 2 and 3 should be improved. For example, Section 3 is titled Environmental Impact; but the last 25 pages of Section 2 also deal with environmental impacts. We feel that the last 25 pages of Section 2 should be included in Section 3 for better organization. This would also eliminate some of the repetition in the Draft EIS.

Since we did not receive the study reports on the individual pools until quite recently, we have no specific comments on those reports.

In Section 3, Environmental Impacts, we also feel several of the statements need further clarification and quantification. Perhaps

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LETTER OF COMMENT
MINNESOTA DEPARTMENT OF NATURAL RESOURCES

the use of more photographs and graphic displays could be included in the Final EIS to depict some of the problems and environmental impacts. As with Section 2, we have pointed out more up-to-date studies and data that could be used, and have differed with the authors on certain points.

We have no comments on Section 4, Unavoidable Adverse Impacts of Operation and Maintenance.

In Section 5, Alternatives, we also have several specific comments later in this letter. We feel that this section should have contained more than 3 alternatives and we also feel that your first two alternatives should have been more thoroughly investigated. Alternative 1, "Cease All Operation and Maintenance Activities" and Alternative 2, "Operate and Maintain Other than a 9-foot Navigation Channel", were only explored in a few brief paragraphs. However, Alternative 3, "Modification to Existing Operation and Maintenance" was explored in over 200 pages. The final statement in the Draft EIS for Alternatives 1 and 2 simply states "Any alternative to the modification and maintenance of the 9-foot channel would not be reasonable because of the controversy concerning the potential impacts that could be involved." We feel that the above statement is inadequate, especially when viewed with the limited investigation of Alternatives 1 and 2.

We also believe that certain other approaches could be explored as alternatives. For example, we feel that the "do nothing" Alternative, or Alternative 1, could be investigated with continual operation of the dams, however, with no dredging. Another possibility is investigation of a maximum 9-foot channel, instead of the minimum 9-foot channel. Included in such an alternative could be comparisons as to amount of dredge spoil between dredging only 9 feet, instead of the present 13 feet. Another alternative could include extensive land treatment measures to reduce the need for channelization. Finally, when all the alternatives have been investigated, comparisons between alternatives could be made as to costs, environmental damage, and other such criteria, in perhaps a matrix format.

We have no comments on Sections 5, 6, 7, 8, or 9.

Specific Comments

Summary xi: The aesthetics of the river setting are certainly not dependent on continued operations and maintenance of the project. Continued proliferation of dredge spoil deposits detracts from the natural qualities of the river that make it aesthetically pleasing to many people. The aesthetic qualities of the river probably will decrease if operations and maintenance continue. Define "heavy public use"

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in reference to recreational use of sandy spoil islands. What percentage of the total number of these islands receives "heavy use"? The statement implies, inaccurately, that all sandy spoil islands are subject to heavy public use. Qualify this statement.

xii: The visual or aesthetic qualities of an area are as much a part of the "environment" as the physical resources. Therefore, the adverse environmental impacts on the total aesthetics of the area should be considered and described. What does the sight of dredge spoil do to someone seeking a natural setting? Obvious evidence of man's alteration of and intrusion in primarily natural areas has a definite adverse impact on their aesthetic values of those areas.

Page 55 Bottom paragraph, last complete sentence, River Warren is not the modern Mississippi but is the Minnesota River.

Page 58 This section would be simplified if a stratigraphic section were presented.

Page 74-75 The comments relating to sedimentation may not be entirely correct; e.g., "Similar adverse impacts also result from naturally occuring sediment deposition unrelated to dredging operations." Please explain these similar impacts. Natural sedimentation process has enhanced the fertility of flood plains. Spoil placement due to dredging decreases natural flood plain fertility. The natural phenomena of sediment deposition is much more orderly than sediment deposition done via dredging. Dredging allows for no natural sorting and deposition. Thus, sediment placement due to dredging in the flood plain poses a greater environmental impact than the natural process of sediment deposition.

Page 76 Are the figures for sheet erosion and annual gully erosion applicable to this specific area? We would suggest further documentation since sheet erosion is usually the greatest sediment contributor.

Page 94 First sentence, reference to Exhibit 77. The diverse zones of vegetation and the listed "common" species may show general and broad values. However, the various habitats and "edge effects" can be important to many other wildlife species. The following should be considered as a qualifying statement on that Exhibit. The importance is seasonal or intermittent depending on the season. An example is the importance oak forests or wood lots are as food for wood duck and deer. Another example is the importance of all marshes or wetlands to many waterfowl species - not just mallard and teal. Other waterfowl species remain as residents and many migratory birds (including waterfowl) use all types of wetlands for courting, food, cover, nesting, and loafing.

Page 105	Second paragraph, third sentence. Qualify this statement. Through continuous commerical development and increased runoff and flood problems, development of most land in the valley, on terraces or not, has directly or indirectly affected the River. All development on a flood plain has some effect on the river. Considerable commercial development has occurred on lands that are not terraces or on terraces very close to the river. A terrace as stated in the reporc should be defined.
Page 107	Pool 2 (aquatic vegetation comments in Pigs Eye Lake). Although aquatic vegetation is limited in the lake, it should be noted that if pollution and turbidity were reduced, marsh habitat and aquatic vegetation would be of better quality and quantity as in earlier times.
Pages 110-116 & Exh. 83	Green's paper (1960) may not be current enough to reflect present conditions relating to aquatic plant species and abundance. It is generally agreed upon by trained aquatic biologists that the aquatic plant communities have changed considerably since 1960 in some pools, especially Pool 5.
Page 117, lines 10-13	We have no documented evidence that a moose was killed near Houston a few years ago, nor of one being sighted near Hastings in 1973. A moose has been seen this past year in the vicinity of Stewartville, which is south of Rochester, Minnesota. A bull elk was shot near Caledonia in 1964.
Lines 13-15	This statement is in error. Two mule deer were shot within 5 miles of each other during the last 2 deer hunting seasons. One was shot in western Houston County and the other in eastern Fillmore County.
Page 118, line 4	Our records show one nutria was trapped in the early 1960's near Etter, Pool 3.
Line 10	According to our game biologists, cottontail rabbits are not common in the Minnesota portion of the Upper Mississippi River Valley.

Lines 13-16	We have not recorded the presence of snowshoe hares in any of the upper pools.
Lines 20-23	The black bears observed in the Whitewater Wildlife Management Area were released there as cubs by person(s) yet unknown. To the best of our knowledge, there is no natural reproduction of bears occurring in this areas.
Exh. 86	Moose and bear should be excluded from this exhibit. Also, the snowshoe hare is rare, if present at all.
Page 123, lines 4-5	The giant Canada geese wintering at Rochester have not, at least according to our observations, used the Mississippi River to any great extent, as the report implies. The present wintering population numbers 12,000 - 15,000 birds.
Page 124- lines 2-3	The large number of wood ducks in the harvest is due to its abundance locally, as well as hunter preference and vulnerability.
Page 126, lines 13-16	The ruffed grouse is much more common than either the pheasant or quail.
Page 131	Fish, last paragraph, first sentence. Northern pike are important game fish, but muskellunge are not an uncommon fish in the river above St. Anthony Falls and none are known to exist below the falls.
Page 135	Second paragraph. Blue suckers (although very few) have been recorded in Lake St. Croix and Lake Pepin in the Mississippi River system within the last 10 to 15 years. Its extinction has not yet been verified.
Page 150, lines 13-14	The timber wolf would not be found naturally in the study area, not "probably not" as the report states.
Page 151, lines 6-8	According to our records, the northern greater prairie chicken is no longer present, not "quite rare" in the study area.
Page 154, lines 7-8	The lotus is common in many of the pools, not "uncertain in distribution" as the report states.
Page 179	Since it is difficult to determine the exact influence

that each of many factors have had in increasing the recreational use of the river, it only can be assumed that "a significant portion of today's recreational activity on the Upper Mississippi River is due to the improved navigation opportunities for large pleasure craft, and to improved fish and game habitat resulting from higher water levels created by the locks and dams". Much more factual data and explanation is needed to back up this claim before it can stand as an unqualified statement.

Page 181 The source for the statistics on projected outdoor recreation demand for the study area as shown on the table on page 181 and in exhibit 108 should be cited.

Last paragraph, first sentence - The report should be more specific when citing sources of information. The 1964 inventory by the Bureau of Outdoor Recreation was not the most recent nor most complete. Both the states of Minnesota and Wisconsin have more recent data available in their respective Outdoor Recreation Plans and this should be investigated.

Pages 186-257 This pool-by-pool account of socioeconomic factors omits several important items:

1. The section on Pool 5 should mention the importance of the area to large flocks of canvasbacks and swans, and the decline in aquatic habitat and hunter success.

2. Mention should be made of the high concentrations of canvasbacks which utilize Pools 7 and 8 during the fall migration.

3. Trapping in general should be more thoroughly evaluated. No mention of trapping is made for pools 7-10. Beaver are a very important resource for the waterfowl habitat they create and maintain. Beaver are also a source of recreation and income to trappers.

Page 185 Precise creel census statistics are available for specific pools for certain years from the Upper Mississippi River Conservation Committee. Please contact the Coordinator's Office in Rock Island, Illinois.

Page 212, line 18 The word "Management" is omitted from Gores Pool 3 Wildlife Area. This omission also occurs in other places. All state game management areas are called Wildlife Management Areas.

Page 213	The most important commercial fishery in Pool 3 is in North and Sturgeon Lakes in the southernmost part of the pool.
Page 214	Data on commercial fisheries fluctuates from year to year. We suggest using a 10-year average.
Page 217, lines 10-11	Migrating waterfowl are not attracted in large numbers. In general, Pool 3 is a poor waterfowl area because of a lack of aquatic vegetation caused in part by fluctuating water levels and the presence of rough fish.
Page 222	Precise creel census data is available for 1962-63, 67-68, and 72-73 (not yet published) from Minnesota DNR and should be included.
Page 238	No data on the sport fishery is shown for Pool 7. Data is available for Pool 7 for 1962-63, 67-68, and 72-73 from the Wisconsin DNR and should be included.
Page 263	The <u>rate</u> of sedimentation is more a function of sea level than the locks and dams. However, the impoundments do affect the <u>site</u> of the natural phenomenon of sedimentation and therefore the rate of sedimentation <u>locally</u>, for example, at the sites of the lock and dams is increased.
Page 264	First paragraph, first sentence. The report states "But the closing of the dams somewhat decreased the River's ability to transport silt and sand." The ability of the River to transport sediment is not decreased, but rather the sediment transported is decreased. The river will naturally attempt to make up for its lost sediment load via channel scour.
Page 265	First paragraph, second sentence. "The water column in the isolated sloughs and river lakes tends to stratify .... ." We cannot agree with that statement. We have not evidenced any flood plain water areas stratifying with a thermocline present.
Page 267	Second paragraph (wing dams). Mention should be made that spoiling on these wing dams has reduced and eliminated valuable aquatic habitat.
Page 268	The dredge spoil areas may appear to be "beautiful sand beaches" to some, but may be ugly, obtrusive waste lands to others. This kind of subjective opinion should be avoided. Many of the dredge spoils are located in backwater areas and are not easily seen or readily accessible for recreational use.

Huge expanses of water do not necessarily benefit the scenery of an area. Perhaps river residents and motorists preferred more marsh or woodland areas. This is another subjective statement that should be avoided.

Page 269 Waterskiing is not dependent on continued operation and maintenance in Lake Pepin. This statement makes it appear as though the invention of waterskiing was in some way affected by the project. This is totally false. Waterskiing could have been invented on Lake Pepin even if there was no project at the time. Towboats and dredge spoil may not be aesthically pleasing to some people because they contrast with the naturalness of the river setting.

Page 270 Paragraph 3. Public ownership and control of lands in the river bottoms does not assure their preservation as a haven for wildlife and fishes. Only those lands owned outright by the Bureau of Sport Fisheries and Wildlife and Minnesota and Wisconsin Departments of Natural Resources give these assurances. Other lands owned by the Corps, municipalities, or other governmental agencies can be used for most any type of development desired. Even though the Corps leases lands to the Bureau of Sport Fisheries and Wildlife expressly for fish and wildlife purposes, the contract between these two agencies can be broken at anytime by the Corps and the land used for industrial and commercial developments.

Page 298 First paragraph. Unstable spoil areas contribute significantly to deposition within the main channel even if the degree is not documented. Natural sedimentation also occurs.

Paragraph 2, 6th sentence. If dredge spoils are placed in the floodway, their placement would increase the flood stage. The States of Minnesota and Wisconsin have been working on defining the floodway in the area of discussion. When agreement is reached as to the location of this floodway, dumping in it may be in conflict with state flood plain laws.

Page 311 Paragraph 1. The last sentence implies that although there is a loss of habitat for some wildlife, the dredge spoil is creating compensation by producing habitat for other species. This sentence may be misleading. Each dredging site and spoiling site is an individual problem. Habitat for certain species is invaluable and cannot be compensated by producing habitat for other species.

Page 319	Second paragraph. The Weaver Marsh has been adversely affected from dredge spoil operations, natural sedimentation, and poor land use planning and development. The reopening of channels into the marsh area and changes in dredge spoil operations should be investigated to correct this problem.
Page 321	The obvious conclusion from Surber's study is that conditions of sedimentation have drastically c'anged since 1928. Also, these changes would appear to be in the proper chronology to coincide with the construction of the 9-foot channel and the associated operation and maintenance activities. So this would appear to be documentation of the fact that the dredging operation has caused the filling of a skiwater area.
Page 329	Second paragraph. Updating of UMRCC designated spoil area study and damages from spoiling is recommended.
Page 339	First paragraph, second sentence. It is our feeling that it would be safe to assume that Watershed Land Treatment <u>would</u> reduce the amount of maintenance dredging .... rather than <u>might</u> reduce it.
Lines 21-23	However, some mention should be made that soilbank programs are presently non-existent, and the current trend is converting grassland and woodland to crops and pasture.
Page 340, lines 18-19	The statement "Forest management practices include protection "from wildlife .... "should be corrected to read ".... protection of wildlife habitat ...."
Page 342	We feel that the costs of watershed land treatment measures should be given more study. In addition to reduced channel maintenance, we feel effective land treatment erosion control measures could keep the soil on land and could enhance agricultural productivity. The future implications of this increased productivity are necessary to consider in light of the expanding world population.
Page 344	Second paragraph, first sentence. Supporting data should accompany such a significant and conclusive statement.
Page 377, lines 21-22	Loss of wildlife and fish habitat are factors that may contribute to justification for increased handling costs.

Pages 416-419	It also should be mentioned that a permanent pool raise of 1' may be very destructive to wildlife habitat, primarily waterfowl and furbearer. Larger open water areas would occur in pools already suffering from a decline in emergent aquatic vegetation. Submerged species would also be affected because of increased turbidity, etc.
Page 458, lines 12-14	We recommend the use of confined spoil placement as illustrated on pages 353 and 354. Unconfined spoil placement is one of the major source of sediment in backwaters and other water areas.
Page 459	Regarding revegetation of spoil - we feel that revegetation of existing spoil sites should be included as well as revegetation of new sites.
Page 466	First paragraph of section entitled Upper and Lower St. Anthony Falls, last sentence. Substantial documentation or scientific evidence for the statement that "little of the material is considered to be returned to the main channel requiring redredging" should accompany such a statement.
Page 470	Second paragraph, last sentence. This paragraph is contradictory. A statement made in sentence 3, a "substantial portion of this material is returned to the main channel for redredging" conflicts with the last sentence which states "for purposes of alternatives evaluation, very little of the material is considered to be returned to the main channel requiring redredging."
Page 498, line 5	"Hanardy Run" should be "Hardy Run."
Pages 508-515	(Pool 5) - Increasing water levels (see page 511) would definitely be destructive to this pool, as the major problem it currently faces is that of declining beds of desirable aquatic vegetation. This pool has probably deteriorated more from spoil deposition than any other one on the river.
Page 526, lines 19-21	The alternative to use Crooked Slough (river mile 726.4) as a spoil disposal site should be carefully considered, as this is considered important wildlife and fish habitat by natural resource agencies and concerned environmental groups.

Summary

We recognize that the operation and maintenance of a navigational channel with the attendant dredge spoil problem has many problems and few simple solutions. However, our department believes that studies of immediate, short-term and long-range problems must be made and alternative solutions recommended. The following comments are intended to emphasize those suggested measures mentioned or alluded to in the report with problem solution in mind.

1. The Corps must hold legitimate spoil conferences to alert affected agencies, organizations and individuals of the Corps' immediate dredge spoil plans and to seek guidance from others to minimize environmental damage. The Upper Mississippi River Basin Commission, through its Dredge Spoil Task Force, can serve as the proper medium for developing those guidelines for solution to the immediate dredge spoil problems of that year.

2. The UMRBC can also serve as a forum to study short term (ten year) volume dredge spoil problems and recommend solutions for time frame as well as long-range problems that would require more extensive solutions. Early indications are that solutions will require multi-agency support since the source of much of the river sediment requiring removal, originates in tributary watersheds where upstream erosion control is needed.

3. *Inadequate funding* to solve some of the problems must be presented by the Corps at its budgetary hearings. To date there is little evidence that Congress has been fully apprised of the problems arising from lack of studies to solve the problems. It is our belief that the Corps is obligated to cite such needs and press their case for adequate programs as studies unfold solutions to these problems.

4. Mitigation measures are proper for replacement of natural resource values lost in any public program wherein project expediency creates unavoidable losses. The Operation and Maintenance of the Mississippi Navigation Channel in the St. Paul district should be no exception. The public's assets in natural resources are not to be expendable for the sake of economic gains. The public must be compensated when such losses occur.

5. As indicated in 3 above, feasibility studies must precede solutions to many of the current problems associated with the operation and maintenance of the navigation system. The Corps must give priority to such studies to determine feasibility of tributary sediment control, dredge spoil containment, and research into off-channel improvement measures, for example.

The Mississippi River has been documented since early exploration of its wealth of natural resource values. It was also recognized

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as far back as 1820 as having tremendous importance for its transportation potential and needs for a navigational system. Our needs for both the protection of the outdoor recreation, fisheries, wildlife, forests, water resources and flood plains, must be balanced with future development for navigation. In this age of technological advancement, it is unreasonable to assume that both cannot co-exist with proper knowledge and planning.

Sincerely,

Robert L. Herbst
Commissioner

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C O R P S O F E N G I N E E R S

ST. PAUL DISTRICT

EXHIBIT 247

MINNESOTA POLLUTION CONTROL AGENCY
1935 W. County Road B2, / Roseville, Minnesota 55113

612-636-5740

May 3, 1974

Colonel Rodney Cox
District Engineer
St. Paul District
U.S. Army Corps of Engineers
1210 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

Enclosed please find Minnesota Pollution Control Agency staff comments on the draft Environmental Impact Statement, Operation and Maintenance - Nine foot Channel, Upper Mississippi River Head of Navigation to Guttenberg, Iowa.

Your extending us the opportunity to comment on the draft EIS is appreciated. Should you have any questions regarding these comments, please feel free to contact Dale McMichael of our central office staff (phone no. 296-7232) or Willis Mattison at our district V office staff in Rochester (phone no. 507/288-1279).

Yours very truly,

Grant J. Merritt
Executive Director

GJM/ae
Enclosures

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MINNESOTA POLLUTION CONTROL AGENCY

STAFF COMMENTS OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT PREPARED BY THE U.S. ARMY CORPS OF ENGINEERS RELATIVE TO THE OPERATION AND MAINTENANCE OF THE NINE FOOT NAVIGATION CHANNEL, UPPER MISSISSIPPI RIVER FROM THE HEAD OF NAVIGATION TO GUTTENBERG, IOWA

This is in response to the invitation of the U.S. Army Corps of Engineers for comment by the Minnesota Pollution Control Agency on the Draft Environmental Impact Statement (EIS) relative to the operation and maintenance of the nine foot Channel, Upper Mississippi River from the head of Navigation to Guttenberg, Iowa. Essentially, the project includes the operation and maintenance of a system of navigation locks and dams on this segment of the Mississippi River and the annual dredging of over 2,400,000 tons of material from the river bed annually at a cost of nearly $1 million. The dredging has been found to be costly in terms of adverse social and ecological impacts from turbidity, burial of aquatic and terrestrial flora and fauna, isolation and resultant eutrophication of backwater areas, interference with recreational craft and deterioration of riverine aesthetics.

The Minnesota Pollution Control Agency was organized under laws passed by the 1967 State Legislature. In the main, the Agency's direct responsibilities are to develop, promulgate and enforce standards to control air, water, land and noise pollution in accordance with mandates of the State Legislature and the Federal Government. Comments contained herein address these direct environmental impacts associated with maintenance and operation of the nine foot channel.

The comments also address matters which until very recently have not been the direct responsibility of the Pollution Control Agency. These matters pertain to the indirect results of actions, such as land-use conflicts, aesthetic impairment and resource depletion. Recent Federal and, more importantly, State legislation has directed that all agencies of government consider these issues in environmental decision-making. The 1973 Minnesota Legislature passed, with few dissenting votes, the Environmental Policy Act which for the first time established a policy to guide environmental decision-making. Among the goals:

— to discourage ecologically unsound aspects of population, economic and technological growth ...,

— preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever practicable, an environment that supports diversity, and variety of individual choice,

— practice thrift in the use of energy and maximize the use of energy efficient systems for the utilization of energy...,

— minimize noise, particularly in urban areas.

The law further states that "all departments and agencies of the state government shall," among other things:

-- "study, develop and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative use of available resources";

-- "recognize the worldwide and long range character of environmental problems and, where consistent with the policy of the state, lend appropriate support to initiatives, resolutions, and programs designed to maximize interstate, national and international cooperation in anticipating and preventing a decline in the quality of mankind's world environment."

There also is a substantial standard in the law to guide actions by all state agencies:

-- "No state action significantly affecting the quality of the environment shall be allowed, nor shall any permit for natural resources management and development be granted, where such action or permit has caused or is likely to cause pollution, impairment, or destruction of the air, water, land or other natural resources located within the state, so long as there is a prudent and feasible alternative consistent with the reasonable requirements of the public health, safety, and welfare and the state's paramount concern for the protection of its air, water, land and other natural resources from pollution, impairment, or destruction. Economic considerations alone shall not justify such conduct."

It is in the spirit of addressing both the growing concern over the very real prospect of serious and continuing energy shortages and in following the mandate of the 1973 Minnesota Legislature that these comments address both the direct and indirect implications of the operation and maintenance of the nine foot channel.

The EIS states that the U.S. Army Corps of Engineers' maintenance of the nine foot channel includes effort to improve the river for fisheries, wildlife, and recreational purposes within the authority and funding available. A specific breakdown of such funding is not given. While the project has possibly lead to increased fish habitat and productivity, there are indications that these effects may be temporary and have proven to be highly detrimental to the overall ecological balance upon which the fish, the wildlife, the vegetation, and indeed, man himself depends.

Routine dredge and spoil deposition by the Corps has had an adverse impact on water quality of the river. Accelerated industrial development associated with increased navigation, increased oil spills and waste dumping associated with barge activity also has had an adverse effect on river water quality. The frequency and magnitude of such spills is treated in a rather cursory fashion and should be expanded in the final EIS. A discussion of the effects of spilled oil and other toxic and hazardous materials on aquatic organisms should be given. Such a discussion should include the short term visible as well as long term toxic effects. These are important impacts of barge shipment of such materials and the industrial development of the Upper Mississippi floodplain which are dependent on the operation and maintenance of the nine foot channel.

Secondary movement of dredge spoil compounds the existing siltation problems and leads to the smothering of aquatic vegetation in backwater areas. This is a significant adverse environmental impact inadequately quantified in the EIS. The EIS states that some 2,370 acres of dredge spoil can be measured from aerial photos. Most of these acres represent areas which were once backwater aquatic habitat. The EIS does not, however, attempt to break down the number of backwater acres of aquatic habitat which are only partially covered with spoil and have not as yet emerged as sterile sand islands which can be measured from aerial photos. Slope data presented in the EIS (10 horizontal to 1 vertical) seems to indicate that submerged dredge spoil deposition areas would constitute a significant portion of the total area affected. The final EIS should quantify the total area affected by dredge apoil deposition with due consideration of secondary movement of the spoil due to wind and water erosion.

Limitations of existing dredge equipment has periodically forced the Corps to disregard a general policy of avoiding the deposition of spoil in the ecologically fragile "gut" areas which provide for inlet of water into backwaters. This practice has cut off circulation of water to back water "lakes" and is a significant factor in stagnation and eutrophication of these areas. Studies to quantify by core sampling and other scientific means, backwaters filling rates due to siltation,direct O & M spoil deposition, and secondary spoil movement are essential. Determination of nutrient budgets for some of the environmentally sensitive backwater areas are lacking in the draft EIS.

A study of annual oxygen profiles to determine the extent and duration of anearobic corditions with associated nutrient releases from bottom sediments would be useful in determining the degree of eutrophication of the backwaters. This information would also be useful in determining the amount of fresh oxygen rich river water necessary to these areas to prevent anearobic conditions from arising.

Secondary dredge spoil movement not only takes place into the backwaters but the common practice of non-confinement of dredge spoil accelerates the return of material back to the channels from which it was originally removed. An adequate evaluation of the economics of dredging demands quantification of (either by estimate or direct measurement) the volume and cost of redredging. The necessity for redredging is a strong argument for on-land disposal of spoil. The fact that dredging and its immediate effects create the need for more dredging downstream should be addressed as a related impact in the final EIS.

The EIS states that according to federal regulations, none of the dredged spoil could be considered as polluted. No information regarding such regulations, making comparisons to tests performed on the dredge spoil, are given in the EIS. In addition, no information is available regarding analysis of undisturbed dredge material or analysis on the dredge spoil is given. Additional information required includes nutrient levels, pesticide-herbicide levels, COD, BOD, oil, grease, and metals concentrations. Core analysis of future dredging locations would help to make a proper assessment possible. Such information in backwater areas could be helpful in assessing the impacts of prior activities.

Exhibit 187 of the EIS gives average values and results of statistical tests of significance for water quality data before, during and after dredging and is based on information obtained in pool 8 in 1973. This table, which is used as a reference when making certain conclusions regarding general water quality, contains no other water quality data from any other pools, and fails to recognize important variables such as diurnal changes or meterological data, and has limited applicability to any other pools.

On page 303 the EIS has identified allochthonous sources such as leaves as being the contributor of nitrogenous nutrients to the river water. Little consideration is given to the autochthonous sources involving the dredge spoil itself. While the leaves and the resulting leaching of organics may be a source of nitrogen, it is highly improbable that the leaves are the sole source of nitrogen and other nutrients.

In the discussion on dredge cutterheads, additional information would be useful in supporting the conclusions given. Specific information regarding the varying rates and efficiencies would be useful in making an assessment. All data available on cutterhead related turbidity including the 197^ study eluded to in the EIS and dredge efficiency without the use of a cutterhead should be presented.

The EIS does make conclusions regarding the water quality impacts of dredging, however, bases the conclusions on a single test on a single operation in a single pool. Added information would increase the reliability of the conclusions if the results found were similar or the same as those of the individual test.

The EIS notes that a derrick barge is used for maintenance dredging on the Minnesota River. No extensive details are given regarding water quality impacts of these specific operations and additional information should be provided in the final draft. The full downstream extent and impact of increased turbidity from both derrick and hydraulic dredging needs to be developed in much greater detail. The derrick barge, from the description given in the EIS, operates in a manner which is unacceptible with regard to established MPCA regulations and/or guidelines. The derrick barge is said to collect spoil material and then deposit the spoil along shore in at least six feet of water where deposition is finally on land "if required."

The EIS notes that a significant reduction in dredging could be realized if studies were done to determine where dredging was either totally unnecessary or where dredging depth could be reduced. In view of the adverse impacts associated with dredging, the agency staff would wholeheartedly support such studies.

The EIS includes a discussion of the effects that the Chippewa River has on the Mississippi River. In using the data given in the EIS a calculation would show the Chippewa to cause up to 37% of all the material dredged in the St. Paul District of the Corps. This is somewhat different from the EIS calculation which is 20%. Our calculations indicate that the Chippewa River does cause over 1/3 of all the dredging performed in the District. If a program were intensified in alleviating problems caused by the Chippewa, the total amount of dredging needed could be significantly reduced. Such a program should include a sediment trap, semi-permanent disposal capability, a confinement site located to facilitate commercial use of the dredge spoil, permanent disposal capability, a Chippewa basin sheet, gully erosion control program, and a Chippewa basin bank erosion control program.

An evaluation of the benefits of such a program should include a study of its potential for reduction in erosion and sedimentation, savings in agricultural productivity, reduced erosion of stream banks, and damage to roads, buildings and other private and public property, improved water quality, and reduced degradation of ecologically sensitive backwater areas.

The position taken in the EIS that unsatisfied bedload carrying capacity caused by control measures on the Chippewa would cause bank erosion problems on the Mississippi raises the question of where such bank erosion might occur and what potential for damage there might be. This should be developed fully in the final EIS.

The EIS notes the need for cooperation and coordination of agencies, such as the U.S. Soil Conservation Service, the Bureau of Sport Fisheries and Wildlife, etc. as well as congressional authorization and funding as major impediments to enacting such programs as erosion and sediment control and selection of spoil sites with minimum adverse impact. We cite as an example conflict between a Bureau of Sport Fisheries and Wildlife proposal for a Upper Mississippi Wilderness Area and Corps operation and maintenance of the nine foot channel and resultant heavy barge use. May we suggest that a project with such significant adverse environmental impacts, extra effort should be exerted toward achieving the needed cooperation, coordination, authorization and funding to enact programs which will mitigate these impacts wherever and whenever possible.

The EIS makes a good case for the bedload trap efficiency of Lake Pepin, however, the 11% of the total sediment load that passes through Lake Pepin represents tons of fine sediment available for deposit in the backwaters below Lake Pepin annually. The impact, real or potential, should be detailed in the final EIS.

The draft EIS repeatedly refers to the sand beaches of the spoil piles as providing valuable nesting areas for turtles, however, no shortage of turtle nesting sites is documented. Also, the spoil pile beaches are cited as valuable and attractive recreational areas, however, it fails to express the magnitude and scope of the litter, garbage, sanitary and other adverse environmental problems associated with such recreational uses. These ideas should be developed with information available through the Upper Mississippi Wildlife and Fish Refuge personnel.

Revegetation of existing spoil piles in an attempt to reduce secondary movement of spoil material would seem to have favorable impact reducing the need for redredging and reducing the damage to the backwaters. However, the application of fertilizers and/or sewage sludge would raise questions of leaching of nutrients to the river and the possibility of removal of these nutrients by floodwaters rendering the attempts fruitless as well as pollutional.

Fish sampling in the area has indicated that there is an increase in the diversity of fish downstream to pool number nine. In that water quality does not necessarily improve downstream, explanations are given for such data and include sampling variations (more fish samplings have been taken downstream) and habitat (the pools and backwaters are more prevalent downstream and create a better fish habitat). Upstream pollution may also be a factor which was not identified in the EIS. In view of this pollution invertebrate trends presented seem consistent with established trends for a river under such stress conditions.

We agree with the EIS that energy consumption for transportation makes up a significant percentage of the total U.S. energy budget. However in view of that fact and the magnitude of the present energy problem we feel that the treatment given this subject was proportionally inadequate to its importance. The subject of energy intensiveness needs to be developed more completely for waterways transportation and all other reasonable alternatives operating under similar circumstances of origin and destination, nature of cargo, etc. and serving the same geographic area.

Likewise the tremendous longrange economic expenditure amounting to billions of dollars for the operation and maintenance of the channel for use by commercial transportation concerns warrants a more detailed investigation of the economics justification of the project. Such an investigation should include a comprehensive assessment of existing and potential transportation facilities and their relative economic value as an element of a national transportation system.

Contrary to the overall theme of the EIS these energy and economic considerations should be developed recognizing the "no project" alternative as a viable one. This is especially important in view of the tremendous environmental impact of the project.

SUMMARY

The Mississippi River 9-foot channel maintenance project does in it present operation have adverse effects and adverse impacts on the environment. It would seem that the adverse effects related to maintenance could be significantly reduced if modifications and alterations of existing practices were made. If, after an exhaustive re-evaluation of the economics and comparative energy intensiveness of Mississippi barge navigation the project remains justifiable implementation of alternatives and modification could enable the Mississippi River to retain its value as a transporter of commerce and also its value as a source of recreation and aesthetic enjoyment. These ends can be achieved if well planned-out changes in existing practices are made in the future. A program encompassing more input and utilization of well planned alternatives could significantly reduce the impacts of the project on the Mississippi River.

MINNESOTA HISTORICAL SOCIETY
690 Cedar Street, St Paul, Minnesota 55101 • 612-221-2747

2 April 1974

Colonel Rodney E. Cox
District Engineer
Department of the Army
Saint Paul District, Corps of Engineers
1210 U.S. Post Office and Custom House
Saint Paul, Minnesota 55101

Dear Colonel Cox:

RE: Draft Environmental Impact Statement
Operation and Maintenance
Nine-Foot Navigation Channel
Upper Mississippi River
Head of Navigation to Guttenberg, Iowa
February 1974

The draft Environmental Impact Statement listed above has been reviewed by the Survey and Planning and Archaeology sections of the Minnesota Historical Society as per your request of 21 February 1974. Concurrence with statements regarding archaeological and historic sites as found in the DEIS (pp.164-168, Pool Subsections, and Exhibits) is held by the Minnesota Historical Society. The review recognizes the great abundance of sites along the channel and the difficulty in recording, researching, and re-surveying the project area.

It is the request of the Minnesota Historical Society, based upon the above mentioned review, that the Society and the State Archaeologist be informed as to the proposed locations for deposit of dredge spoil and construction. These locations known, it will then be possible to assess the resulting effect with reasonable accuracy. Proposed spoil and construction sites should list alternative locations which would take into consideration avoidance areas exhibiting high archaeological or historic potential.

Respectfully,

Russell W. Fridley

Russell W. Fridley, ~~Director~~
Minnesota Historical Society

cc: Dr. Elden Johnson, State Archaeologist
200 Ford Hall
University of Minnesota
Minneapolis, Minnesota 55455

Alan Woolworth, Chief Archaeologist
Minnesota Historical Society

Charles W. Nelson, Supervisor
Historic Sites Survey & Planning; Minnesota Historical Society

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CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 249

LETTER OF COMMENT
MINNESOTA HISTORICAL SOCIETY

COMMISSIONERS
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THOMAS A BATES BELLEVUE
JIM D BIXLER COUNCIL BLUFFS
JOHN G LINK BURLINGTON
JOHN C THOMPSON FOREST CITY
HERBERT T REED WINTERSET
CAROLYN T LUMBARD DES MOINES

IOWA CONSERVATION COMMISSION

FRED A. PRIEWERT, Director
300 Fourth Street, Des Moines, Iowa 50319
515/281-5145

An EQUAL OPPORTUNITY Agency

April 1, 1974

Rodney E. Cox
Colonel
Corps of Engineers
District Engineer
Department of the Army
St. Paul District
1210 U. S. Post Office
and Custom House
St. Paul, Minnesota 55101

Re: 9-Foot Channel

Dear Colonel Cox:

I have reviewed the Mississippi River 9-Foot Channel O & M draft environmental impact statement which was sent to me in my capacity as the State Historic Preservation Officer for Iowa. I consider the statements concerning archaeological and historical reasons inadequate for an accurate assessment of project impact.

The report does not begin to reflect or suggest the importance of the floodplains to man during the past 11,000 years, nor does it suggest that the diversity of food resources and raw materials available figured importantly in prehistoric settlement patterns and subsistence systems. Neither does it suggest that the encampments and village sites reflecting seasonal procurement schedules exist (or existed) along the sloughs, ponds and streams which are present.

We may, on the basis of our limited understanding of prehistoric settlement patterns, suggest that all of the ponds, sloughs, islands and tributary streams have evidence of this prehistoric occupation along their banks. Similarly, the dependence of early Euro-American settlers upon the same national resources permits us to assume the liklihood of the presence of historic sites in the same areas.

Because the operation and management of the 9-Foot Channel poses a direct threat to those historic and archaeological sites which survived the initial construction of the locks, dams, and attendant pools, I should like to make the followina points.

LETTER OF COMMENT
IOWA CONSERVATION COMMISSION
1 APRIL 1974

Colonel Rodney E. Cox
April 1, 1974
Page Two

1. The draft EIS does not discuss the need for a survey which would locate and identify archaeological or historical sites or historical objects, such as sunken riverboats, prior to any dredging operation.

2. The draft EIS does not discuss or intimate the need for the scientific recovery of data and/or artifacts from historic or archaeological sites located by such a survey prior to authorization of a dredging project.

3. The Corps of Engineers, as directed by Executive Order 11593, has the clear responsibility to survey property underits jurisdiction and control to determine the presence of historical and archaeological resources, and to nominate to the National Register those which meet the criteria.

The final Environmental Impact Statement must address itself to the fact that the number and distribution of archaeological and historical resources is not known because there has never been an adequate survey. It should note that the Corps has the responsibility to insure that such surveys are conducted and discuss the methods to be employed.

The State Historic Preservation Officer for Iowa will make every attempt to establish and maintain close liaison with the St. Paul District in order to provide for and coordinate such surveys along the Iowa border. It is suggested that prior to the authorization of any dredging operations which will result in the deposition of spoil upon islands or floodplains the St. Paul District might:

1. Identify the dredging and spoil deposition areas for the State Historic Preservation Officer.

2. Through coordination with the State Historic Preservation Officer, cause a survey of the area to be conducted by qualified individuals.

3. Report the results of the survey to the State Historic Preservation Officer.

4. If the survey identifies historic or prehistoric sites or objects which would appear likely to be adversely effected, take steps to implement Section 106 of the National Historic Preservation Act of 1966, and to determine potential National Register significance in compliance with Executive Order 11593.

Sincerely,

Adrian D. Anderson
State Historic Preservation Officer
State Historic Preservation Program
B-13 MacLean Hall

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 250

COMMISSIONERS
LES LICKLIDER, CHAIRMAN—CHEROKEE
THOMAS A. BATES—BELLEVUE
JIM D. BIXLER—COUNCIL BLUFFS
JOHN G. LINK—BURLINGTON
JOHN C. THOMPSON—FOREST CITY
HERBERT T. REED—WINTERSET
CAROLYN T. LUMBARD—DES MOINES

IOWA CONSERVATION COMMISSION

FRED A. PRIEWERT, Director
300 Fourth Street, Des Moines, Iowa 50319
515/281-5145

An EQUAL OPPORTUNITY Agency

April 25, 1974

Rodney E. Cox
Colonel
Corps of Engineers
District Engineer
Department of the Army
St. Paul District
1210 U. S. Post Office
and Custom Office
St. Paul, Minnesota 55101

Dear Colonel Cox:

Enclosed are comments made by Dr. Clark Mallam, Luther College, concerning the Nine Foot Channel O & M draft EIS for the Mississippi. I have also included a copy of my letter to him.

It seems to me that it would be very practical for one of your staff to meet with us to determine how to implement and plan the floodplain surveys which need to be done in order to comply with EO11593.

Judging from the main thrust of the draft EIS; the need for dredging, we should be able to arrange for surveys of the spoil deposition areas so that when work is initiated we will have checked them for the presence of archaeological sites.

Sincerely,

Adrian D. Anderson

Adrian D. Anderson
State Historic Preservation Officer
State Historic Preservation Program
B-13 MacLean Hall
Iowa City, Iowa 52242

ADA:pas

Enclosures

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CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 251

LETTER OF COMMENT
IOWA CONSERVATION COMMISSION
25 APRIL 1974

April 3, 1974

Dear Adrian,

Received the 9 foot channel report this morning and decided to write you immediately. In short, my initial reaction is one of disbelief. Disbelief, in the sense that we have been virtually eliminated by administrative fiat. If you wish to quote me I will go on record as stating that this report is completely invalid since it is based on a virtual absence of site data.

Certainly, the early surveys concentrated on the bluff line areas which will not be affected by the raising of the channel or spoil deposits. However, the report makes no mention of the possibility of sites in the floodplain itself. The work being undertaken at Luther would strongly suggest that prehistoric peoples for some time were engaged in a process of Intensive Harvest Collecting (Struever 1968) in the floodplain area. The reason we have no evidence for this process is simply that no surveys have been conducted in the floodplain. It should seem apparent to these investigators that if numerous mound groups are located along the bluffs it is only logical to assume that the people were systematically exploiting the diverse and abundant natural resources in the Mississippi trench.

In summary, I cannot, in any manner, accept the statements in this report pertaining to archaeology. Rather than write off the possibility of sites in the Mississippi trench, it would seem more logical to fund a series of surveys for this area. If I can be of any assistance in developing research in this matter please feel free to contact me.

Sincerely,

Clark

R. Clark Mallam, Director
Archaeological Research Center
Luther College

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 251

COMMISSIONERS
LES LICKLIDER, CHAIRMAN—CHEROKEE
THOMAS A. BATES—BELLEVUE
JIM D. BIXLER—COUNCIL BLUFFS
JOHN G. LINK—BURLINGTON
JOHN C. THOMPSON—FOREST CITY
HERBERT T. REED—WINTERSET
CAROLYN T. LUMBARD—DES MOINES

FRED A. PRIEWERT, Director
300 Fourth Street, Des Moines, Iowa 50319
515/281-5145

An EQUAL OPPORTUNITY Agency

April 25, 1974

Mr. Clark Mallam
Director
Archaeological Research Center
Luther College
Decorah, Iowa 52101

Dear Clark:

Thanks for taking time to review the St. Paul District's Nine Foot Channel Report on the Mississippi.

I will send a copy of your comments to the District Office to place in their files. As you know, EO11593 requires that the Corps of Engineers provide for surveys of land under their jurisdiction. This would certainly include the Mississippi floodplain along Iowa's border. I have not yet had an opportunity to meet with representatives from that office, but I am sure they will be willing to assist in seeing that these surveys are conducted. The Rock Island District has agreed to be of assistance in this, and I think the St. Paul District will, too.

Sincerely,

Adrian D. Anderson
State Historic Preservation Officer
State Historic Preservation Program
B-13 MacLean Hall
Iowa City, Iowa 52242

ADA:pas

Enclosure

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COMMISSIONERS

FRED A. PRIEWERT, Director
300 Fourth Street, Des Moines, Iowa 50319
515 281 5145

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May 8, 1974

Rodney E. Cox
Colonel, Corps of Engineers
District Engineer
Department of the Army
St. Paul District
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Re: NCSED-ER Upper Mississippi O & M Report

Dear Sir:

Thank you for your response to my letter of April 1, 1974. I am encouraged by your recognition of the need for surveys in areas selected for spoil deposition and wish to reiterate my desire to assist in the coordination of such studies along Iowa's border. I think we both recognize that it has been difficult to arrange for surveys on short notice. The community of professional archaeologists in Iowa, coordinated through the State Historic Preservation Program is, however, attempting to develop the machinery which will give us the ability to provide for such survey work. We look forward to cooperating with the Corps of Engineers in this work, and appreciate this indication that our assistance would be welcomed.

Sincerely,

Adrian D. Anderson
State Historic Preservation Officer
State Historic Preservation Program
B-13 MacLean Hall
Iowa City, Iowa 52242

ADA:pas

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 252

LETTER OF COMMENT
IOWA CONSERVATION COMMISSION
8 MAY 1974

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

L. P. Voigt
Secretary

BOX 450
MADISON, WISCONSIN 53701

April 5, 1974

IN REPLY REFER TO: 1600

Colonel Rodney E. Cox, District Engineer
Department of the Army, St. Paul District
Corps of Engineers
1210 U. S. Post Office and Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

Re: NCSED-ER, Draft Environmental Impact Statement, Operation and Maintenance of the 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa

The Department of Natural Resources has partially completed its review of the Draft Environmental Impact Statement for the Maintenance and Operation of the 9-Foot Channel. Our review, like the preparation of the Draft Environmental Impact Statement, was undertaken by an interdisciplinary team composed of fish and game biologists, water resources specialists, natural resource managers, and engineers. These comments will be divided into two parts - General Comments and Specific Comments. We are presently submitting our General Comments which will consider the overall scope and critical issues. We will submit our specific comments keyed to page, paragraph, and sentence as found in the Draft Environmental Impact Statement prior to May 6, 1974, which is the official review deadline according to CEQ guidelines. Although a preliminary review deadline of April 8, 1974, was previously established, the procedural deadline would prevail since it was properly notified by publication in the Federal Register (Volume 39, Number 59, Friday, March 22, 1974). In keeping with the spirit of your advance notification, we will provide the remainder of our comments, which we also request to be considered in the preparation of the Final Environmental Impact Statement, by April 23, 1974. It is felt that this review period is essential in order that we may thoroughly study the Environmental Impact Statement and correlate its findings with those contained in your consultant's Environmental Impact Assessment which we received on April 2, 1974.

The comments included in this review and the review which will be forthcoming are aimed at existing and future environmental problems that pose grave portents to the future of the Mississippi River. The fact that the Mississippi River has undergone significant environmental changes in the past few years is clear to the trained resource manager as well as to the observant

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CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 253

LETTER OF COMMENT
WISCONSIN DEPARTMENT OF NATURAL RESOURCES
5 APRIL 1974

hunter or fisherman. These rapid changes threaten the future of valuable fish and wildlife resources as well as the social and economic well being of the people who depend upon them. In this regard, the responsibilities of this Department are clearly defined in the Wisconsin Constitution, State Statutes, and nearly a century of resource protection efforts.

General Comments

An indepth analysis of this Draft Environmental Impact Statement points out that the Corps is attempting to defend an ongoing program that is a clear antithesis of the congressional mandates and executive orders contained in Exhibit 227. To an uninformed observer, the present techniques and assumptions for analyzing the impacts attributed to the operation and maintenance of the 9-foot channel may not appear to be unreasonable. However, the result of this procedure is that the adverse impacts of the project are largely ignored while the benefits are overemphasized. The methodology used was to first analyze the impacts of operation and maintenance of the project, and then to superficially examine the impacts ascribed to the presence of the project. As a result, important adverse impacts, such as sedimentation, could be attributed to natural processes. It is our position that in order to arrive at the presently missing cause and effect relationships of the project it would be necessary to rigorously analyze the adverse and beneficial impacts due to the presence of the locks and dams first. This should then be followed by a complete and thoroughly documented assessment of the impacts attributed to the operation and maintenance of the project. It is our belief that this procedure would point up several cumulative adverse impacts, and would provide a clearer understanding of necessary remedial measures.

Within the Draft Environmental Impact Statement itself, there are several substantial ambiguities which lead to contradictions on important points. For instance on page 75, where it is stated that "Dredging is also costly in terms of possible adverse environmental, social, and ecological impacts..." On page 263, it is stated that "It is not always possible to clearly differentiate between the effects of the project and natural events occurring on the river nor is it always possible to decide whether a given impact is beneficial or adverse." On page 293, it is stated that "Approximately 2,370 acres of dredge spoil sites have been identified." And on page 305, it is stated that "It is not possible to accurately determine, on an acreage basis, the extent of river habitat affected by any one influence, such as disposal of maintenance dredge spoil." On page 305, the statement is made that "The spoil frequently spreads out into off-channel areas affecting several types of shallow aquatic habitats such as marshes, floodplain lakes and ponds." While on page 295, there is yet another contradiction to the effect that "Since spoil deposition directly in such slough entrances is avoided, it is most probable that where dredge spoil is implicated in such problems, it is through erosion and subsequent redeposition of dredge material." On page 297, exactly two pages later, an admission is made that "Although dredge spoil has been inadvertently placed in the entrances ("guts") of feeder channels for backwaters in isolated cases, the general practice in placement of dredge spoil is to avoid such areas." This continued vacillation is repeated several times throughout the Environmental Impact Statement.

If the Corps is readily willing to accept the benefits of the project, it should also be willing to accept the responsibilities for any adverse environmental impacts. On page 180, the statement is made that "A significant portion of today's recreational activity on the Upper Mississippi River is due to the improved navigation opportunities for large pleasure craft and to improved fish and game habitat resulting from higher water levels created by locks and dams." On page 268, a debatable statement is made that "Dredge spoil has created beautiful sand beaches along the main channel of the river." On page 271, the statement is made that "This (the locks and dams) has resulted in an increase of barge traffic which in turn has lead to more economical transportation of goods, and increased development of commercial docks and industrial complexes along the river. These activities have been of substantial economic benefit and they have contributed to the employment, growth, and development of communities, particularly at the northern end of the navigation system."

Educated and enlightened with the aforementioned "facts" and clearly defined and documented "adverse and beneficial impacts", the reader is given a choice of 241 pages of alternatives. With this kind of information in hand, it is needless to say that the average reader would be persuaded by a range of alternative costs varying from $740,000 per year ($.50 per cubic yard) for the status quo to $8,950,000 per year ($5.95 per cubic yard) for central disposal. However, the reader is not informed that these figures only represent production costs and do not reflect environmental costs. To further complicate the issue, the Draft Environmental Impact Statement states on Page 573 that, "Further consideration should be given to any alternative measure before it is recommended for implementation. In some cases, the actual feasibility and/or the specific impacts and effects of an alternative measure would have to be determined by a detailed study." With this presentation of information, one can only conclude that the existing Environmental Impact Statement is intended to justify the status quo alternative rather than to seek out alternatives which would minimize or reduce environmental degradation since no such detailed feasibility studies were done to determine the impacts and effects of present dredging operations. A further qualification is made on page 576 that "The status quo plan currently has Congressional authority, is within agency policy, and is being funded." It is not mentioned, however, that this authority is over 40 years old and that Section 103 of NEPA requires that "All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act." Section 2 of NEPA states "The purpose of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; <u>to promote efforts which will prevent or eliminate damage to the environment</u> and biosphere and stimulate the health and welfare of man... ." (emphasis added).

Another major inadequacy of the Draft Environmental Impact Statement is the paucity of consideration given to compatibility of the operation and maintenance of the 9-foot channel with the state's statutory responsibilities and authorities. The Department of Natural Resources administers several regulatory functions under the Wisconsin Statutes including bulkhead lines (Section 30.11, Wisconsin Statutes); dredging (Section 30.20, Wisconsin Statutes); enlargements of waterways (Section 30.19, Wisconsin Statutes); fills or structures below the ordinary high watermark (Section 30.12, Wisconsin Statutes); and water pollution functions under Chapter 144, Wisconsin Statutes. The present practice of indiscriminate dumping of dredge spoil materials by the Corps of Engineers in wetlands, in navigable waters and on valuable upland habitat without any consideration for erosion protection or containment is difficult to justify to the private individual seeking a permit for the same type of authority. The same type of conflict arises in the administration of the State Flood Plain and Shoreland Zoning Rules contained in Wisconsin Administrative Codes, NR 115 and 116. Executive Order 11296 states "The heads of the executive agencies shall provide leadership in encouraging a broad and unified effort to prevent uneconomic uses and development of the Nation's flood plains and, in particular, to lessen the risk of flood losses in connection with Federal lands and installations and federally financed or supported improvements." In Flood Hazard Evaluation Guidelines for Federal Executive Agencies (1972) prepared by the United States Water Resources Council, it is stated that "It should be recognized that flood plains have unique and significant public values, including wildlife habitat of recreational, aesthetic and scientific value, open space, and ground water recharge. The value of the flood plain as an environmental resource and the public benefits to be derived from it should be considered." It is further stated in these guidelines that "In carrying out the responsibilities under Executive Order 11296, the Federal Executive Agencies should: Determine whether there are existing laws or statutes of the federal government, rules or regulations of other federal agencies, or laws, statutes, ordinances, etc., of state or local governments that provide standards for regulation of the flood plain under study. In cases where those standards are either more stringent than those based on these guidelines, or are applicable to situations or conditions not covered by these guidelines, they should be considered for evaluation of flood hazard in that area. By "more stringent" is meant a standard that is more severe or restrictive in order to provde greater safety or to reduce flood hazard more effectively. Federal agencies should support the States and local governments to make their rules, regulations, standards, etc., fully effective." In reviewing the Draft Environmental Impact Statement, only one brief reference with respect to placement of dredge spoil in the floodway could be found where it was stated on page 298 that "The operation and maintenance activities do not cause either significant increases in flood stages or greater flood frequency than would be the case without navigation improvements." Since the Corps of Engineers also administers regulatory permits for dredging and fills below the ordinary high watermark and flood plain use, we feel that it is important to discuss what controls for preventing fish and wildlife habitat losses and environmental pollution are imposed upon private applicants which are not also applied to the operation and maintenance of the 9-foot channel.

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 253

We are extremely concerned that more attention was not given to the value of maintenance dredging at the mouth of the Chippewa River in order to decrease the bed load coming into the navigation channel. This is especially important since it is admitted that the influence of the Chippewa River bed load could reach to Pool 6, and that the Chippewa River contributes an estimated 20 percent of all maintenance dredging in the St. Paul District. In this regard, watershed land treatment should have received more attention.

The Draft Environmental Impact Statement should completely discuss the long-term adverse effect of the 9-foot channel. The creation of a series of impoundments in a staircase fashion and the resulting silt and sand deposits due to decreased water velocities would tend to raise the entire valley floor. The increased hydraulic efficiency of the main channel would cause accelerated eutrophication and sedimentation of backwater areas. Past experience with mill ponds throughout the State of Wisconsin provides an indication of what is in store for the various pools of the Mississippi River. Several years after construction of a dam, the lake may provide suitable habitat for fish and waterfowl; however, in time, the lake bed fills with sediment and its value for fish and wildlife habitat decreases correspondingly. Terrestrial species eventually occupy the area. The only solution, although often a partial answer, is to deepen the area by dredging or by raising the water levels. The aquatic habitat provided by many of the pools and backwater areas in the Mississippi River is experiencing the same phenomenon. The natural movement of bed load in the Mississippi River has been retarded by the locks and dams and aggravated by spoil deposition for channel maintenance. At the date of writing of this Environmental Impact Statement, 2,370 acres of fish and wildlife habitat have been directly covered by dredge spoil placed in the flood plain, and an average of 2,000,000 cubic yards of dredge spoil is displaced each year in the St. Paul District. It is predicted that the status quo alternative would result in the destruction of an additional 2,705 acres of natural wildlife habitat including about 1,135 acres of aquatic habitat in the next 50 years. An important question which must be considered is which uses of the Mississippi River will future generations value most? It would be reasonably safe to say that future generations would most highly value those uses which were valid, which were currently in short supply, and which were the most difficult to recreate unless a dire neccessity required their total consumption. Thus, as the Mississippi River wetlands, sloughs, and backwater areas diminish, their intrinsic value will increase. Discussions on these points should be elaborated upon in Section 7, Irreversible and Irretrievable commitments of Resources, and Section 6, The Relationship Between Local Short-Term Uses of Man's Environment Versus Maintenance and Enhancement of Long-Term Productivity.

It should be recognized that although a substantial portion of the value of the Mississippi River results from recreational use, a point of overuse could be reached as has been demonstrated in several national parks. Before more recreational facilities and conveniences such as beach areas, faster recreational lockages, better access, and more harbor facilities are proposed, a determination should be made on how much stress could and should be placed on natural areas without losing more than is gained for the recreational user. Without adequate planning, development for recreation could be as potentially damaging as continued development for navigation.

The Draft Environmental Impact Statement omits any references to establishment of scientific areas by State and Federal agencies. This appears to be an oversite which shows a lack of thoroughness in approach. In combination with the Bureau of Sport Fisheries & Wildlife, the Wisconsin Department of Natural Resources has designated one State scientific area in the Nelson-Trevino Bottoms. Four other areas on the Wisconsin side of the channel are being studied as potential scientific sites. These areas which are under study for potential scientific area sites include: Bertom Lake, Turtle Island, Black River Bottoms and the Kinnickinnic River Delta. It is assumed that similar areas may exist on the Iowa side of the channel.

We request that these general comments and the specific comments which will be forthcoming shortly be considered in the preparation of the Final Environmental Impact Statement.

Very truly yours,
Bureau of Environmental Impact

C. D. Besadny
Director

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 253

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

L. P. Voigt
Secretary

BOX 450
MADISON, WISCONSIN 53701

April 23, 1974

IN REPLY REFER TO: 1600

Colonel Rodney E. Cox, District Engineer
Department of the Army, St. Paul District
Corps of Engineers
1210 U. S. Post Office and Customs House
St. Paul, Minnesota 55101

Dear Colonel Cox:

Re: NCSED-ER, Draft Environmental Impact Statement, Operation and Maintenance of the 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa

The Department of Natural Resources has completed its review of the Draft Environmental Impact Statement for the Operation and Maintenance of the 9-Foot Channel in the St. Paul District. This letter contains our specific comments referenced to page, paragraph and sentence as found in the Draft Environmental Impact Statement. We request that these specific comments as well as the general comments contained in our letter of April 5, 1974, be considered in the preparation of the final Environmental Impact Statement.

Specific Comments

Page XI, Item 3a, Environmental Impacts - To imply that "aesthetics" and "fish and wildlife production" are dependent on navigation in the 9-foot channel is misleading. Certain actions associated with improving commercial navigation such as creation of the impounded pools, wing dams, etc., created habitat changes in areas where aesthetic beauty and fish and wildlife production previously existed. The implication that the absence of a 9-foot channel and associated activities would mean a loss of fish, wildlife, and natural beauty is erroneous. The comments following the statement tend to be slanted and taken out of context. In our opinion, the destructive effects of the dredge spoil deposits outweigh the value of any new habitat created for fish and wildlife.

Turtles undoubtedly nest on spoil areas but there is no evidence that turtle populations have shown significant increases as a result of dredging or that a lack of nesting sites were a limiting factor to turtle production in the past. If turtle numbers have increased with dredging, it is questionable whether more turtles justify fewer bass, bluegills, muskrats, and ducks.

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EXHIBIT 254 LETTER OF COMMENT
WISCONSIN DEPARTMENT OF NATURAL RESOURCES
23 APRIL 1974

AD-A133 512 OPERATION AND MAINTENANCE 9-FOOT NAVIGATION CHANNEL UPPER MISSISSIPPI RIV..(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT AUG 74

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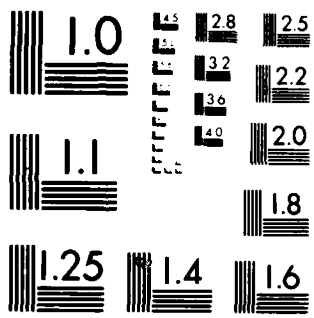

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

These spoils sites may eventually revegetate in a period of decades; however, this revegetation may not necessarily result in the development of a "typical" bottom land forest containing such species as swamp white oak, ash, or silver maple. The frequency of deposition and its initial erosive character prevents revegetation on many important spoil areas.

Although there is heavy recreational activity on some spoil sites, others have such steeply eroded banks or have such high piles of spoil material that recreational use is discouraged. Campers, swimmers, picnickers, and boaters tend to utilize spoil deposit sites that are closer to the main channel. Those spoil sites which have resulted in the covering of backwater areas or which have resulted in the killing of overstory vegetation frequently are not used by recreationists.

Page XI, Item b, Adverse Environmental Impact - Spoil placement can also affect aquatic habitat removed from the navigation channel by the cutting off of vital flows of fresh water. As a result, increased siltation reduces the depth of backwater areas and leads to stagnation with an eventual loss of aquatic habitat.

It should be clarified that "The placement of spoil frequently affects submerged wing and closing dams which provide excellent habitat for the production of aquatic invertebrates and fish."

It is our opinion that spoil material is frequently eroded from spoil sites by river currents and winds and is redeposited in the mouths of chutes or in backwater areas.

Page 3, First Sentence - It is our opinion that the inland waterway system should be considered as a part of a total integrated transportation system including all modes of transportation.

Page 6, First Paragraph, Second Sentence - Although the locks and dams were originally constructed for commercial navigation purposes, it should also be pointed out that the project is a multi-purpose development, and that the recreational values of the Mississippi River are of considerable economic benefit.

Page 9, First Paragraph, Last Sentence - Although the operation and maintenance of the 9-foot channel project has been tacitly approved by Congress for the past thirty-five years, we wonder why Congress has not also been informed of the need for a change in dredge spoil disposal methods and the need for fish and wildlife enhancement.

Page 14, Paragraph One, Fifth Sentence - If the 9-foot channel is actually dredged to a depth of thirteen feet, would the 12-foot channel be dredged to sixteen feet?

The question of over-dredging the 9-foot channel to thirteen feet deserves far more consideration. Areas of shoaling due to decreased flows

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and prop wash from tows should not be the general rule for most of the navigation channel. We would, therefore, assume that this general policy of over-dredging may not be necessary.

Page 15, Bottom Picture - It is interesting to note that the spoil site being created in front of the private residence is an uncontained spoil site, and that no attempt has been made to reduce turbidity created by the discharge. In such an instance, this spoil site could contribute to poor land use practices in the floodway of the Mississippi River.

Page 20, Paragraph One, Fourth Sentence - A total cost of 32.7 cents per cubic yard for dredge spoil disposal on the Mississippi River is extremely low when compared to dredge spoil costs for other projects. There are instances when the cost for dredge spoil disposal exceeds $5.00 per cubic yard for contained dredge spoil sites.

Page 22, Second Paragraph, First Sentence - We know of many instances when these dredge requirements have not been delivered in a timely manner. At times, we have not received the information on where the dredging would be undertaken until after the dredge Thompson has already started work. In other instances, information was received only a few days prior to when the dredging was scheduled.

Page 23, Second Sentence - We know of instances in the State of Wisconsin where the 1969 Dredge Spoil Survey was used as a justification for spoiling in certain areas. This survey report was rescinded in part because of such misuses and for instances of noncompliance with the recommendations contained in it.

Page 23, Fourth Sentence - The dredge spoil conference which is referred to in this sentence is set up early in the dredging season before any detailed information on dredge sites and dredge spoil disposal areas is known. This meeting has often been extremely frustrating since no solutions have been proposed. Since the project is undertaken with the existing plant, the only alternative which is available is what type of habitat will be traded off next. The Corps is aware that coordination at these meetings is difficult due to the restrictions placed upon dredge spoil disposal locations; however, no solutions have been proposed to date.

Page 24, Third Paragraph, First Sentence - We would assume that the dredge spoil disposal sites which are shown in red on Exhibits 31 through 42 are diagrammatic since we have noted discrepancies in the location of the sites, particularly in the region of Indian Slough at the mouth of the Chippewa River.

Page 25, Second Paragraph, First Sentence - The spoil site indicated near Crosby Slough is rather interesting in that it shows considerable secondary movement of dredge spoil downstream from the disposal area. We also note that there were three spoil sites which were placed in the open water at approximately river mile 790.7. A field investigation during the summer of 1973 revealed that only a small portion of one of these open water spoil sites remained. It is obvious that the other two and a good portion of the remaining spoil site had been eroded away.

Page 31, Last Sentence - We assume that this sentence should read "the gate openings have been computed so the maximum allowable discharge will not be exceeded----".

Page 42, Fourth Sentence - Although the volume of material dredged for the maintenance of harbors is small compared to that dredged for the navigation channel, any spoil deposition in critical fish and wildlife habitat could have a significant impact.

Page 43, First Paragraph, First Sentence - The "swale" referred to is an extension of the bottom lands between Cochrane and Fountain City. These bottoms are included within the state-owned Whitman Dam Wildlife Area. The seepage through the ditch has the same effect as a series of springs, and open water exists all winter. It is a wintering area for a considerable flock of mallards and black ducks.

Page 47, Items A and B - We request that a break down of spoil disposal sites by ownership of land be provided in this section. As in the past, the disposal of any dredge spoil materials on islands or land owned by the Department of Natural Resources will not be allowed.

Page 47, Last Paragraph, First Sentence - It is stated that the Upper Mississippi River Fish and Wildlife Refuge is primarily a result of the 9-foot navigation project. This seems to be giving undue credit to this particular navigation project.

Page 48 - Since this section is devoted to the interrelationship and compatibility of operation and maintenance activities with other projects, we feel that some consideration should be given to the proposed 12-foot channel project, the proposed year-round navigation project, and the City of La Crosse flood control proposal.

Page 48, Last Sentence - We would suggest that this sentence be changed to read, "However, more recently, fish and wildlife interests have stated that maintenance and operation activities, primarily dredge spoil disposal, are having an adverse effect on fish and wildlife habitat."

Page 49, First Paragraph, Second Sentence - As mentioned previously, the treatment of the 9-foot navigation project is of extreme concern to us since it has allowed for an over-emphasis of beneficial impacts and an under-emphasis of the adverse impacts.

Page 50, Third Paragraph, Third Sentence - It should be clarified that all waters from the Black River enter Pool 7 above Lake Onalaska. The old mouth of the Black River has been inundated by Pool 7.

Page 51, Second Paragraph - We suggest that the average annual discharge of the Wisconsin River be included in this section. It would also be appropriate that major rivers such as the Chippewa, Black, Trempealeau, and Wisconsin should deserve more attention in the Environmental Impact Statement.

Page 52, First Paragraph, Last Sentence - We suggest that this sentence be changed to read, "The drainage is so good that few natural lakes exist in this section except on the Mississippi River floodplain."

Page 74, First Paragraph - In reviewing this Draft Environmental Impact Statement, it is obvious that there is much to be learned about the movement of bed load and subsequent redeposition of sediments and also the long-term changes induced by sedimentation. We strongly recommend that continued investigation of sedimentation be undertaken since it is not clear which are the consequence of the original channel establishment and which are being induced by continued dredging.

Page 74, Last Sentence - The cost of $1,000,000 for dredging in the St. Paul District does not agree with the figures given on Page 20.

Page 75, Second Sentence - We do not agree that natural sedimentation is similar to that from dredging operations since sediment deposition by natural forces is gradual, allowing for an adequate opportunity for vegetative adaptations.

Pages 79 and 81 - It is indicated in paragraph two of page 79 and paragraph one of page 81 that the material being dredged for maintenance of the 9-foot channel consists mainly of bedload, and that the bedload is an average of ten percent (range of 0-40 percent) of the total sediment load of the Mississippi River. In paragraph one of page 82 it is indicated that the coarser bedload material is normally contained within the navigation channel except during periods of heavy flooding when backwater areas receive faster flows than normal resulting in a deeper penetration and more deposition of sediments. Therefore, it could be concluded that reducing bank erosion, which is a primary source of bedload, would not only benefit maintenance of the navigation channel but would also decrease sedimentation of backwater areas during periods of heavy flooding.

Page 80, Paragraph One, Third and Fourth Sentences - The "intended canalization effect" and increased "hydraulic efficiency" has had a harmful effect on fish and wildlife habitat. In order to provide more water in the main channel, it is necessary to reduce water in the backwater sloughs and channels. By doing this, sedimentation and eutrophication of the backwater areas is increased. Continued placement of dredge spoil in order to enhance the hydraulic efficiency of the channel seems to disregard the statement by the United States Water Resources Council that "It should be recognized that floodplains have unique and significant public values, including wildlife habitat of recreational, aesthetic and scientific value, open space, and ground water recharge. The value of the floodplain as an environmental resource and the public benefits derived from it should be considered."

Page 83, Second Sentence - Our analysis of this sentence indicates that Exhibits 65 and 66 are less than estimates. It seems rather redundant to quantify data and then to consider those data as approximations.

Page 83, Item a - It is concluded that since more material is being dredged than is theoretically being deposited, additional sediments must be entering from bank erosion on the Mississippi River itself, from construction along the river banks, or from erosion of spoil banks. Thus, some of the same sediments may be dredged and deposited two or more times. We know of several instances where dredge spoil has been redeposited in the navigation channel. The current practice of depositing dredge spoil along the channel side of existing spoil sites in areas of fast flows and erosive velocities certainly contributes to the secondary movement of dredge spoil. The lack of containment and protection of spoil sites in the form of riprap and vegetation would obviously lead to erosion and redeposition of previously dredged sediments.

Page 84, Item C - It is stated that the Chippewa River is responsible for about 20 percent of all maintenance dredging in the St. Paul District, and about 93 percent of the total sediment load of the Chippewa River comes from the reach of the stream between Eau Claire which includes only 17 percent of the drainage area. Samples of spoil sites show that Chippewa River sediments are carried at least to Pool 6. Since Pool 6 was the lower end of sampling for Chippewa River sediments, it is probable that these sediments may be carried further downstream, and that the Chippewa River may be the major contributor of sediments below Lake Pepin. If measures were taken to control stream bank erosion, it is stated that in dredging Pools 4, 5 and 5a could be reduced by 35 percent. This estimate seems rather conservative since reductions in sedimentation could also occur further downstream than Pool 6.

Page 86, First Paragraph, Fourth Sentence - The capability of the Missisippi River in this reach to move the bed load supplied by the Chippewa River can be attributed to the numerous wing dams shown in Exhibit 37 rather than through natural causes.

These wing dams acting in concert with dredge spoil material deposited along the main channel have contributed to the degradation of the Nelson-Trevino bottoms.

Page 88, First Paragraph, Last Sentence - This sentence seems to indicate that the data contained in Exhibits 67, 68, 70 and 71 are statistically meaningless for comparison or for drawing any conclusions.

Page 89, First Paragraph - It is indicated that Exhibit 69 may show that sediments in Pool 6 more closely resemble those from the Trempealeau River rather than the Chippewa River. A review of this exhibit does not necessarily lead us to the same conclusion. Thus, it would be necessary to provide the studies and sampling data in the Environmental Impact Statement in order for us to make a determination in this regard.

On pages 91 and 92 it is concluded that the sediment yield of the Chippewa River, based on past dredging records, may be only 300,000 cubic yards. The sediment yield of the Chippewa River may be larger if the studies were to show that sediment from the Chippewa River is being dredged farther downstream than Pool 5A. On the botton of Page 92, the "experiment" performed in 1965 where 314,000 cubic yards of sediments were removed from the mouth of the Chippewa River is explained. Since the sediment trap filled up, it was assumed that the volume of the sediment trap was equal to the Chippewa River bedload contribution. It is our conclusion that this

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estimate is not valid since there was no continuous monitoring and the control of the study was extremely poor. It is very possible that the sediment trap may have filled up quite rapidly which allowed a large volume of sediments to bypass the sediment trap and continue downstream. We are unable to find any definitive information in the Draft Environmental Impact Statement which proves or disproves this point; therefore, since the bedload contribution of the Chippewa River is in question, the value of maintenance dredging at the mouth of the Chippewa River must be reexamined.

Page 93, First Paragraph, Third Sentence - The indication of a trend toward less dredging in relationship to river discharge indicates that the navigation channel is becoming increasingly more hydraulically efficient. Dredge spoil disposal in combination with secondary movement from the existing dredge spoil sites and wing dams would appear to be responsible for the increased hydraulic efficiency of the channel. If the channel has become more hydraulically efficient, this would explain why the backwater areas are aging and filling with sediments. Should this process continue into the future, it could only be expected that the value of much of the Mississippi River resource would decline.

Exhibit 75 shows a gradual decline in the quantity of sediments dredged versus cumulative annual discharge for the Mississippi River at McGregor. Information should be provided which would explain why the ratio declined until the 1950's at which point it stabilized. We would like to know if the Corp's dredging policy changed at this time to dredge to deeper depths, to perform dredging at an earlier time, or to somehow change the dredging operation? We would also like to know if the planned operation of the Dredge Thompson may be responsible for the stabilization. It could also be possible that since the amount of dredging has stabilized the Corps is actually performing unnecessary dredging either by dredging areas before they really become a problem or by overdredging to 13 feet rather than 12 feet or some lesser depth. Some locations may stabilize at 10 or 11 feet, but as a matter of practice are overdredged anyway.

Page 94, Biological Aspects of the Study Area - We find that there has been little original research or documentation of plant and animal communities which are being affected by the operation and maintenance of the 9-foot channel. Most of the information which is presented has been obtained from other sources.

A better understanding of the ecology of the study area could be presented by relating the relative densities of the various species to the different types of habitats. This is particularly important for rare or endangered species. It would be helpful to know where cormorant nesting sites are located, and what habitat is critical for their survival. The same analysis should be done for eagles. In addition, the impact of channelization and dredge spoil disposal on endangered species should be evaluated.

In order to make this section more meaningful, information should be provided on the historical plant and animal communities. The impact of the construction of the locks and dams and operation and maintenance of the project on previously existing plant and animal communities should be evaluated.

Page 98, Third Paragraph, Last Sentence - It should be pointed out that all of the species listed are scarce expect for river birch.

Page 102, Second Paragraph, Second and Third Sentences - The value of vegetation that colonizes dredge spoil sites should be evaluated for its importance to man and wildlife. It has been our experience that the dredge spoil sites do not revegetate for many years after the spoil has been placed. An evaluation should be made on the length of time it would take for a dredge spoil site to naturally revegetate.

Page 102, Second Paragraph, Last Sentence - It should be specified that the recreational users of dredge spoil sites are mainly campers, picnickers, swimmers, and boaters. We would question whether these sites receive the most recreational use of the total land area in the pools. It could be expected that bank fishermen and waterfowl hunters would also account for a substantial amount of recreational use on certain lands.

Page 103, Last Paragraph, First Sentence - We would question whether terrestrial vegetation has not significantly changed since inundation by the locks and dams. A considerable amount of terrestrial vegetation has already been altered by dredge spoil disposal. This has resulted in several dredge spoil areas of large size having little or no existing vegetation. Sedimentation of backwater areas has resulted in the conversion of wetlands and open water areas to upland. Based on the past changes, we would expect that there is far more terrestrial vegetation at the present then there was at the time of inundation by the locks and dams. The creation of the impoundments has had a significant impact on terrestrial vegetation.

Page 104, First Paragraph, Seventh Sentence - Common elder is also known as elderberry.

Page 108, Third Paragraph, Fourth Sentence - We would question whether watercress would be found in the protected backwater areas of the St. Croix River since this aquatic plant is typically associated with cold spring water sources.

Page 116, First Sentence - This listing of aquatic plants in Pools 4 and 9 is obviously out of date since it is over twenty-seven years old. Considerable habitat changes have taken place since this survey was completed. For instance, Vallisneria is listed as having a trace of a percent of occurrence. It is known that there are considerable beds of this particular plant in Pool 7.

Page 120, Paragraph Two - This section is incomplete since no mention is made of the value of wetlands and marshes to aquatic furbearers and of the economic value of the animals which are harvested. An indication should be given on the current value of aquatic furbearer pelts. An assessment should be included on the effect of dredge spoil disposal in sloughs and marshes on reduced furbearer populations.

Page 122, First Paragraph - It is our opinion that this section should be expanded to include an evaluation of the importance of backwater areas to waterfowl. The effect of dredge spoil disposal on the continued use of backwater areas by migrating waterfowl should be evaluated. The value of waterfowl hunting to the area economy should also be included by discussing the number of hunter trips and their success rates.

Page 122, Second Paragraph, Page Three - Canada geese are mentioned as users of the Mississippi River; however, no mention is made of blue and snow geese although Exhibit 88 lists these birds as common migrants.

Page 122, Last Sentence - The statement is made that "The geese have responded to specific refuges so that most of the population now flies to Necedah, Wisconsin". Actually few geese go to Necedah. It was probably intended to mean that they go to the Horicon National Wildlife Refuge, although this is questionable since banding information shows that a sizable portion of the Canada geese migrating down the Mississippi River are associated with the eastern prairie population which winter in Missouri. The Mississippi Valley population passes through Horicon and winters in southern Illinois.

Page 124, Third Sentence - The statement is made that wood duck ducklings are unable to cross railroad tracks. This is a misleading generality. Newly hatched ducklings may not be able to cross railroed tracks; however, older broods, which are still classified as ducklings, have no such problem.

Pages 129 to 130 - This entire discussion presumes a waterfowl population that was the same each year, which is not true. Many other factors for controlling population levels were involved including overshooting, pothole drainage, development of alternate rest-stops for geese, etc. The river bottom in its preimpoundment condition could have attracted as many waterfowl, or fewer waterfowl, depending upon local conditions. For instance, in the Tiffany Widlife Area, if the water conditions were low throughout the summer and flooded in September, thousands of acres of annuals such as Bidens were inundated, which made for excellent waterfowl food. The occasional drying out of potholes, marshes and wetlands is also of value to waterfowl habitat. Drying out aerates the soil, and when wet conditions again occur, the aquatic vegetative growth is stimulated especially for such species as Bidens and Polygonum. In total, it is probably true that the impoundment of the Mississippi River favored resting and feeding habitat for waterfowl; however, it also decreased nesting habitat especially for wood ducks. Impoundments also tend to concentrate waterfowl making them more vulnerable to overshooting.

Page 130, First Sentence - It is quite possible that the deterioration of submergent aquatic vegetation was due to the severe flooding and resulting sedimentation during the 1960s, particularly during 1965.

Page 131, Second Paragraph - The fishery section of this Environmental Impact Statement is inadequate and has been mainly treated in terms of unsupported generalities. It appears that the many UMRCC fishery reports and published Mississippi River papers have been virtually ignored or given cursory consideration in this section.

Page 131, Second Paragraph, Fourth Sentence - The white fishes no longer have family status and are included under the family Salmonidae. Exhibit 90 employs the correct terminology in this regard.

Page 132, First Paragraph - "Mississippi River" should be omitted as a descriptive term for the paddlefish.

Page 134, First Paragraph, Fifth Sentence - The decline of buffalo fish probably resulted from competition with carp or habitat alteration rather than from overfishing.

Page 134, Paragraph Two - It should be stated that impoundment of the river resulted in the inundation of many gravel bars. It should also be mentioned that when the silt was scoured from the channel, it exposed sand rather than rock or gravel.

Page 134, Paragraph Three - Lake and wetland habitat is more important to northern pike than to walleye. Walleye and sauger are able to prosper in a large river environment such as the Mississippi River.

Page 135, Paragraph One - The "Ohio shad" is now called the "Alabama shad". The correct terminology for the shovelnose sturgeon does not indicate a hyphen in its name. The blue sucker has been taken frequently in the lower Red Cedar River and the lower Chippewa River during the 1968 to 1973 period. This suggests that extirpation north of the Keukok Pool is not likely. The UMRCC annual report for 1964 reported the blue sucker in Pool Five. The Department of Natural Resources has also captured blue suckers in Pool Seven.

Page 136, Sentence One - The source of preimpoundment data which has been used to make the statement that the increased productivity of carp, buffalo fish, catfish, sheephead, and suckers should be included. Any increases in commercial harvest may reflect fishing pressure and improved gear and techniques rather than increased productivity.

Page 136, First Paragraph, Third Sentence - The role of gar and bowfin as a serious predator on game fish is certainly questionable. There is some indication that these predatory species may be beneficial by preventing overpopulation and subsequent stunting of the fishery, particularly panfish.

Page 137, First Sentence - We would like to know where the lake sturgeon has increased in numbers on the Mississippi River.

Page 138, Paragraph One - It should be clarified that the high number of benthic organisms collected at the mouth of the Kinnikinnick River were not associated with the removal of dredge spoil material. It seems likely that these invertebrate populations were due to some factor other than dredging.

Page 142, Third Sentence - We would also assume that Pools 7, 8 and 9 produce significant numbers of Hexagenia.

Page 143, Second Paragraph - We would question whether amphipods could be described as being "small crayfish-like organisms." They could be better described as "shrimp-like organisms."

Page 148, First Paragraph, Last Sentence - This sentence implies that dredging has saved this threatened species of mussle. This is the wrong inference to make, and we would ask what would be done to protect this species during dredging?

Page 148, Paragraph Two - The official list of Wisconsin endangered species included in Chapter 29.415, Wisconsin Statutes, should be mentioned. The new Endangered Species Act of 1973 included in its definition "..any species.. throughout all or a significant portion of its range." Therefore, local situations become increasingly important. In this regard, several misleading statements should be clarified, such as on page 152, paragraph one.

Page 150, Paragraph Two - "locally rare" is an artifical term not used in any federal or state terminology. New uses of old terms should not be introduced into an already cluttered literature. Wisconsin has an official list of endangered animals, and a supplementary list of rare or declining animals called "changing status".

Canada lynx, northern bald eagle, osprey and cormorant are found the Mississippi River as well as elsewhere in the state of Wisconsin. They are endangered in this state although not nationally. These animals are not "locally rare". In addition, many of the species listed in exhibit 98 are on Wisconsin's changing status list.

Page 151, First Paragraph, Second Sentence - The statement that prairie chickens are "quite rare in the project area" is incorrect. It is our opinion that prairie chickens are not now and have not been in the project area since the installation of the locks and dams.

Page 152, Second Paragraph - We doubt whether the nine-foot channel navigation project has had anything to do with the concentration of eagles at the mouth of the Chippewa River. We would suspect that this area had open water even prior to the establishment of the locks and dams. There is no evidence to suggest that the shortage of winter feeding areas has limited the population of eagles. It is more probable that pesticides and disturbance by man has had a greater effect on the limited populations of bald eagles. Some mention should be made of the congregation of eagles at Genoa during the winter time.

Page 152, Third Paragraph, First and Second Sentences - Since the double crested cormorant is listed as an endangered species in the State of Wisconsin, we request that the location of nest sites be indicated in the Draft Environmental Impact Statement. We also feel that the effect of the operation and maintenance of the 9-foot navigation project should be evaluated with respect to the continued perpetuation of the species.

Page 153, Third Paragraph - It should be pointed out that the species of plants which are legally protected under Section 29.546 of the Wisconsin Statutes includes American lotus, trailing arbutus (Epigaea repens), ladyslipper orchid (Cypripedium), members of the orchid family

(Orchidaceae), trillium (Liliaceae), American bittersweet, pitcher-plants, (Turks caps), and wood lilies. American lotus occurs in large beds in portions of the Mississippi River backwater areas. Operation and maintenance of the 9-foot channel could adversely affect this species.

Page 154, First Paragraph, Second Sentence - The American lotus is common in several pools of the Mississippi River including Pools 7 and 8.

Page 157, Second Paragraph, Last Sentence - Since water-oriented recreation is an economically important asset to this portion of the upper midwest, we request that the economic value of this industry be indicated.

Page 159 - Contrasting the upper picture with the lower picture, it is interesting to note that several acres of wetland areas were inundated by the construction of L&D 4.

Page 160, First Paragraph, First and Second Sentences - While the 9-foot navigation project may have been important to the national defense of the Nation in the 1930's, it is doubtful that in this day and age it would be of significant strategic value. Since this portion of the Mississippi River has a 9-foot channel, it would be questionable whether any large naval vessels could even navigate the Mississippi River. The possibility of nuclear warfare, combined with the advent of long-range aircraft and intercontinental ballistic missiles, puts the Mississippi River and it's locks and dams within easy striking distance of any hostile nation with conventional armaments.

Page 161, Last Paragraph, and Page 162, First Paragraph - While the veracity of these statements may have been questioned at the time of authorization of the 9-foot channel project, the Mississippi River is beginning to resemble the state indicated by many of these predictions. Erosion has resulted in a considerable amount of sedimentation and movement of bedload in the Mississippi River. Pollution, particularly in the upper pools, has adversely affected water quality and the fisheries It is also true that the operation and maintenance of the 9-foot channel has had an adverse impact on the smallmouth bass fishery, and that it has cost a considerable amount of money to dispose of the dredge spoil materials.

Page 162, Second Paragraph, Second Sentence - The prediction that the pools would fill with sand within a period of 20 years was perhaps short-sighted; however, it is known that the backwater areas are gradually filling with sediments.

Page 163, Last Paragraph, Last Sentence - The statement that a spectacular increase in barge traffic and tonnage is evidence of the economic success of the project is not adequate proof that the project is desirable. At this point in time, part of the economic success of the project is dependent upon the continued disposal of dredge spoil materials at a cost of 33 cents per cubic yard. This has resulted in environmental losses. It has not been shown that the operation and maintenance of the 9-foot channel project is an economic success to the taxpayer

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or if it is solely an economic success to the barge interests. In order to determine the econcmic success of the project, it would be necessary to know the cost of operation and maintenance of the 9-foot channel and also the environmental costs which are connected with the project.

Page 164, First Paragraph, First Sentence - As stated previously, it is felt that the treatment of the effect of the original project on the natural environment was minimal, and that this point needs additional detailed analysis and consideration.

Page 174, First Paragraph, First Sentence - It should also be noted that an additional Wisconsin state park has been established at the mouth of the Kinnikinnick River. This new park, located in Pierce County, is called the Kinnikinnick River State Park. The Kinnickinnic River delta at the mouth of the Kinnickinnic River is also a dredge spoil disposal site.

Page 174, Third Paragraph, First Sentence - The statement that "Since 1940 when the 9-foot channel had been placed in operation, river traffic increased rapidly" cannot be made since the tonnage figures in the table at the bottom of page 174 ends at the year 1945. Thus, nearly 30 years of data have not been placed in this table for consideration.

Page 175, Second Paragraph, Second Sentence - This is not to say that should the barge traffic on the 9-foot channel be eliminated, the economy would collapse. It would appear that alternate transportation modes could be developed which would not be so heavily dependent upon governmental assistance.

Page 175, Third Paragraph, Last Sentence - This sentence sounds as though competing forms of transportation should not be encouraged, and that they in fact are occasionally more economically feasible than barge traffic on the Mississippi River.

Page 176, First Paragraph - It is requested that similar data be prepared for transportation by railroads in order that the data shown in the table at the top of page 176 could be compared to the amount of shipments made by barge traffic.

Page 177, Second Paragraph - It should be clarified that part of the reason that the 9-foot channel project has resulted in a savings in transportation costs for bulk commodities is due to laws against railroads with regard to large bulk shipments. In order to state that the shipment of cargo by water is more economical than the next least cost alternative, data should be provided to substantiate the calculations of this apparent economic benefit. It is entirely possible that if the total environmental costs of the present system of dredge spoil disposal were taken into account, that maintenance of the 9-foot channel would become sufficiently expensive to render water transportation less economically advantageous. If the environmental costs involved with present dredge spoil disposal practices and costs for operation and maintenance of the 9-foot channel project were added to unit costs for barge traffic, the savings over other least cost alternatives would be less than 4 to 5.4 mills per ton mile.

Page 178, First Paragraph, Last Sentence - The statement is made that "Dredging and the movement of tugs and barges does increase water turbidity to which must be added pollution from barge spillage and cleaning. Yet this pollution is small relative to the pollution load placed in a river from other sources" cannot be made unless a comparison is made to other sources of pollution. This Department has had experience with oil spills from barges. In examining the materials oftentimes transported by barge, it is found that cargoes such as fuel oil and ammonia are potentially hazardous.

Page 178, Third Paragraph, Fourth Sentence - It should be stated that the commercial value cited in this sentence is only the amount of money paid to the commercial fishermen. In order to provide a clearer picture of the commercial value of the fishery of the Mississippi River, the value of the products should be traced from the fishermen to the consumer. In many cases, the value of the fishery to the consumer is several times what is paid to the commercial fishermen.

Page 179, First Paragraph, Last Sentence - An average value of $100,000 annually for raw fur prices would amount to a value of $3,000,000 in the 30-year period. The value of fur should be followed from the price paid to the trapper to the finished fur on the retail market and all the steps in between in order to get a total economic value.

Page 180, Second Paragraph, First Sentence - This statement cannot be made until the adverse impacts attributed to the presence of the project are completely described in order to determine the changes in fish and wildlife habitat and recreational opportunities. Our opinion is in comformity with the previous statement which states, "Segregating present day recreational uses of the study area from those existing in 1930, prior to the 9-foot channel, presents problems. It is difficult to isolate increased recreational uses of the river caused by more people in the region, changed standards of living, and increased leisure, from those caused by improved navigational and other recreational opportunities."

Page 182, First Paragraph - It is our opinion that Exhibit 108 is in need of more consideration in this section. It is interesting to note that the recreational supply remains rather steady from 1980 to the year 2020 while the need increases considerably. It is difficult to visualize the rational for requiring an additional 2,825 acres of flood plain for the status-quo alternative for the next fifty years in the face of this increased recreational need and the rather static recreational supply.

Page 182, Second Paragraph, First Sentence - The statement is made that much of the increased pleasure boating on this portion of the river is made possible by "improved navagational opportunities provided by the system of locks and dams". It is extremely unlikely that most of these pleasure boats would require a 9-foot channel in which to operate, and most would probably be capable of operating at a depth less than 6 feet. Therefore, the relevance of this information to the 9-foot channel impact statement is questionable.

Page 182, First Paragraph - This rather minimal discussion of Exhibit 108 points out the need for safeguarding the existing fish and wildlife habitat from an economic point of view. There are no other feasible alternatives to safeguarding this recreational base. If the whole recreational industry supported by the Mississippi River were calculated into this value, the need for resource protection would be much clearer. The value of this recreational industry may in fact overshadow the value of the 9-foot channel for barge traffic.

Page 184, Second Paragraph, First Sentence - As stated previously, Wisconsin has five state parks on the upper Mississippi River within the project area. The Kinnickinnic River State Park at the present time, however, only has a walk-in access to the St. Croix River.

Page 185, Second Paragraph - It is our opinion that the discussion of the upper Mississippi River for sport fishing and hunting is not adequate. The census techniques and methods for presenting these data have not considered the increased value of the upper Mississippi River to sport fishermen and hunters. A great deal of information, particularly in relationship to the value of the Mississippi River to sports fishermen, can be obtained from consulting UMRCC fishery reports. In addition, the Department of Natural Resources has prepared a number of creel census reports on the Mississippi River.

Page 186, Second Sentence - The concentration of fish in the tailwaters below the locks and dams is probably more in response to food and rheotactile responses, rather than the higher oxygen levels. Most of the fish that inhabit the tailwater areas are species which are adapted to swift currents such as walleye, sauger, and white bass. The observation that most of the fishermen were located in the tail-waters based on Exhibit 110 is incorrect since the surveys were taken from the locks and dams. An examination of the UMRCC 5-year creel census reports may indicate that there are periodic concentrations of fishermen in other areas of the pool. For instance, it is known that there are heavy concentrations of bluegill fishermen in the Brices Prairie area of Pool 7.

Page 186, Second Paragraph, Socio-economic Factors Pool by Pool - The method for calculating changes in commercial and recreational lockages and this entire section is not consistent. For instance, commercial lockages are evaluated on a percent increase while recreational lockages are evaluated on the basis of an absolute number increase. It is requested that commercial and recreational lockages be evaluated on the same basis of either absolute number increases or percent increases. The current method of presentation makes it impossible to make any meaningful comparisons between the two.

Page 214, First Paragraph - It is suspected that the price fluctuations for the commercial fishery catch in this pool may vary due to the poor taste of the fish imparted by the influence of pollution. The percentages in the table at the middle of this page do not correspond with UMRCC data.

Page 219, Paragraph Three - The 1967 catch depicted in exhibit 133 is 10,000 low.

Page 219, Last Paragraph, Last Sentence - Actually the prices have changed little on an annual basis until just recently. At times, the demand drops when the market is flooded by large seine catches when the fish cannot be sold. Gear effectiveness, success in locating fish concentrations, and water conditions all have important influences on the commercial fishery catch.

Page 222, First Sentence - We suggest that the UMRCC creel census be consulted to determine the number of fishermen visitations to Pool 4.

Page 223, First Paragraph, First Sentence - In order to make this statement, it would be necessary to know what the waterfowl migrations were and what the hunter success rates were prior to impoundment.

Page 223, Second Paragraph - Populations of certain fish species such as walleyes may have increased after the 9-foot channel project was implemented. Whether this increase has resulted in better quality fishing and hunting is less certain. After an initial period of high production, the amount and extent of fish and wildlife habitat now appears to be shrinking, and the river appears to be moving toward a single purpose channel with diminished recreational value. If this trend continues, it is certain that the recreational value of the Mississippi River will be less than that of the pre-project river.

Page 225, Last Paragraph, Last Sentence - It is not certain how the extensive commercial fishery in Pool 4 would affect the commercial fishing in Pool 5. It is assumed that the smaller acreage of Pool 5 is probably a major factor in the smaller catch; however, this does not explain the drastic decline in the past few years. Again, the figures depicted in exhibit 140 do not agree with UMRCC records.

Page 226, First Sentence - In order to make this statement, it would be necessary to know the catch of commercial fish and the type and amount of gear utilized prior to impoundment.

Page 228, Paragraph One, Last Sentence - By "maintenance problems", it is assumed that it was intended to mean littering and sanitation problems. At the present time, littering is a major problem on small islands and sandbars formed by dredge spoil disposal. This problem will, of course, not be solved by ignoring it.

Page 228, Second Paragraph - As can be noted on Exhibit 37, Pool 5 has been extensively degraded by dredge spoil deposits particularly in the Weaver Bottoms. It is our contention that the one-third decrease in catch in spite of a one-third increase in fishing pressure is indicative of current dredge spoil practices which forespells the future of this pool.

Page 229, First Paragraph - It is our opinion that waterfowl hunter successes should be compared through the years, similar to that [illegible] for the creel census. It should be clarified that the average of 12,035 hunters and the average bag of 15,600 waterfowl annually is the total number for all four pools, and that the number of hunters and their success has not been segregated out for each of the pools.

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Page 230, First Sentence - It should be clarified that the closed areas are established by the Bureau of Sport Fisheries and Wildlife. For consistency, references should be made to all closed areas in each pool as they are discussed. Pool 4 is a good example of where this should have been done.

Page 231, First Paragraph, Last Sentence - Again we see no documentation on the extent of commercial fishing in this region of the river prior to construction of the 9-foot channel compared to the level of commercial fishing in Pool 5a after construction.

Page 232, Third and Eleventh Lines - The inference is that "inviting sandbars" and "main channel and dredge spoil sandbars" are natural and aesthetically pleasing features. These inferences should be clarified by stating that often the sandbars are eroded and lack vegetation which renders them aesthetically unpleasing. The placement of dredge spoil material frequently destroys valuable waterfowl and fish habitat.

Page 233, Last Paragraph, Second Sentence - The statement that "dredge spoil placement and sedimentation in recent years has reduced waterfowl habitat somewhat" is an example of continued vacillation and neglect in assuming the responsibility for the adverse impacts attributed to the operation and maintenance of the 9-foot channel project.

Page 236, First Paragraph - The trapping of furbearers in Pool 6 is high, but is mostly restricted to private lands of which 5,000 acres or more are included within the Delta Fish and Fur Farm. Although the Delta Fish and Fur Farm is serviced by its own control structures, the wetlands in back of the dikes may be influenced by seepage water from Pool 6.

Page 240, Second Sentence - If Pool 7 is not an origin or a terminal for barge traffic, why did the lockages through L&D number 7 increase more than those for L&D number 6?

Page 240, Paragraph 2, Third Sentence - These commercial fishery catch fluctuations are largely due to the presence or absence of large seine hauls.

Page 242, Paragraph 2, Sentences Three and Four - Exhibit 158 does not distinguish between the fishermen counts at Lock and Dam numbers 6 and 7. It should be pointed out that the Department of Natural Resources has conducted spring and fall creel censuses on the Pool 7 tailwaters for the past several years. This information would be more definitive than the simple counts of fishermen made by lock masters.

Page 245, Third Paragraph, Second Sentence - It should be noted that two access sites are provided on the Minnesota side of the channel above and below the Interstate 90 bridge.

Page 247, First Paragraph, Second Sentence - This large number of fishermen observed at the tailwaters of Pool 8 is due primarily to the large population center adjacent to Lock and Dam number 7 and indicates the value of the walleye and saugar fishery in the Pool 8 tailwaters.

Page 247, Paragraph 2, Second Sentence - We feel that trends in waterfowl harvest rates and hunter success rates should be indicated.

Page 256, Second Paragraph, Second Sentence - There are also fishing floats located below Lock and Dam numbers 6 and 7; however, they may not attract as many fishermen as the Clements fishing float.

Page 257, First Paragraph - The sunfish species which were most important in the sport fish catch were probably bluegills.

Page 257, Paragraph 2 - It could be safely assumed that both sport and commercial fishing, and particularly sport fishing, would have probably increased whether or not the locks and dams were constructed.

Page 263, First Sentence - The reference should be to Exhibit 172 and not Exhibit 165.

Page 263, First and Second Paragraphs - Again we find the only impacts which have been summarized are the beneficial impacts. This entire section is inadequate. The importance of slough openings are understated and the effects of subsequent erosion and secondary movement of spoil disposal areas are glossed over. The most important consideration is the vast alteration induced by the locks and dams which were largely completed in the 1930's. At this time, we are looking at 35 to 40 years of successional changes. These changes are not at an end; however, many short-term changes have occurred and some stabilization has been achieved although the operation and maintenance of the project still produce continued disturbance. It should be emphasized that continued ecological changes, related to succession, are occurring and will occur in the future. Thus, with this continued successional change, the Mississippi River will not be the same in another 35 to 40 years, should the present operation and maintenance of the 9-foot channel continue. It should also be recognized that any environmental benefits arising from the construction of the original project will have been completely negated by that time. The environmental benefits which are indicated in this Environmental Impact Statement will at some time in the future be termed short-term uses of man's environment to the detriment of long-term environmental productivity.

Page 263, Third Paragraph, First Sentence - This sentence should be changed to read: "The impoundments have increased the rate of accumulation of sand and silt in the floodplain." It is unacceptable to say that the effects of the locks and dams on the rate of sedimentation are not known and cannot be predicted. If the last sentence of the first paragraph on page 264 is taken literally, one would have to question the acceptability of the locks of dams at any level of resource value consideration.

Since the majority of the Mississippi River sediment is coarse-grained and is carried as bed load along the channel bottom, the dams have had a much more significant effect on reducing the sediment carrying capacity than is indicated here. Under natural unimpounded conditions, the locations of the channels very likely shifted with erosion, but were at some state of equilibrium in which the overall profile of the river was more constant than it is in the impounded state. It is stated in the first paragraph of page 64, that there are no means of predicting the length of time required to fill the pools with sediment to a level even with the crest of the dam spillways. It would appear that if the Corps had any confidence in Exhibit 65 (the curve relating the capacity inflow ratio to the trap efficiency of the pool) the data contained therein could be used to determine the length of time required to fill a given pool by using progressively smaller volumes of storage based upon the sediment inflow of the previous season. In addition, it appears that the calculations of some of the principal investigators have been ignored. For instance, it has been estimated that 20 to 40 percent of the capacity of Pool 7 has been lost to sedimentation since its installation. Thus, it would appear that the statement that it would take a thousand years for the pools to fill is extremely incredulous. We would like to know why the sedimentation rates and water loss from areas other than the main channel cannot be measured. It is our position that this impact statement should attempt to answer those critical questions instead of counting the number of boat landings, the number of recreational lockages, the number of commercial lockages, and similar meaningless data which are peripheral to the real issue of the adverse impacts which can be attributed to the operation and maintenance of the 9-foot channel project.

Page 264, First Paragraph, Second Sentence - The uppermost one-third of the pools resemble the preimpounded river only in general aspects. In many respects, the environment of the upper pool has been significantly altered since the sloughs do not run as fast as they did in the past, the floodplain lakes and marshes no longer dry up in dry weather cycles, and in general, sedimentation is occurring at a faster rate.

Page 265, First Paragraph, Second Sentence - In a section which should contain a detailed description of environmental impacts, it is found that the best that can be done is, "The general tendency is for backwater sloughs of rivers, lakes and ponds to become isolated from the main channel by a combination of natural movement of sediments, floodplain construction, and by the dredged material." It is essential to know specifically how much of this general tendency can be attributed to each of the following factors: natural movement of sediments, floodplain construction, and dredge spoil disposal practices.

The separation of backwater lakes and ponds from the main channel would be looked upon as an adverse affect on water quality as stagnation, oxygen depletion, and sedimentation result when the backwater areas are no longer in communication with the flowage streams.

The "floodplain construction" and disposal of dredge spoil in these areas would probably be contrary to Wisconsin Law and/or to Floodplain Management Standards.

Page 266, First Sentence - The impoundment of the Mississippi River has benefited certain fish species and has harmed others. Thus, the increase in pounds of fish has not been an entirely positive impact. Most of the total increase in poundage of fish can be attributed to the proliferation of species such as carp and sheepshead which are of relatively low value for sport fishing.

Page 266, Second Paragraph, Third Sentence - This should not be construed to mean that the unimpounded river would not also have a productive sport fishery given liberal regulations.

Page 266, Third Paragraph, Second Sentence - A natural unimpounded river is quite capable of producing abundant food for fish. Pool "production" areas and tailwater "feed lots" are not essential to a good sport fishery. The aesthetic and sport fishing potential of tailwater concentrations of fish is beginning to result in the congregation of more fishermen than is desirable. Good sport fisheries, particularly for bass, existed in natural floodplain lakes which were subjected to fluctuating water levels. These fisheries would have existed naturally without the necessary fish rescue work.

Page 266, Third Paragraph, Third Sentence - This fish rescue work was probably done as a public relations effort rather than out of biological necessity. Modern day fishery management techniques seldom rely on fish rescue work except for the harvesting of species which could be utilized to populate new waters.

Page 266, Third Paragraph, Fourth Sentence - The fluctuating water levels which cause fish to be stranded in floodplain pools could be largely attributed to the wing dams and closing structures installed for the 4½-foot and 6-foot channels. The resulting increased hydraulic efficiency of the channel resulted in the isolation of backwater areas and sloughs as more water was shunted down the main channel. In reality, a natural river system very seldom has fish kills or stranded fish unless there are incidences of gross pollution. Thus, the implication that the Corps of Engineers has saved the Mississippi River fishery from extinction through the construction of the 9-foot channel, is not correct. In fact, current dredge spoil disposal practices have resulted in the isolation of backwater areas, trapping of fish in stagnant pools and subsequent fishkills.

Page 267, Paragraph 1 - It is probably correct to say that the 9-foot channel project increased muskrat habitat. However, since beaver typically locate on the flowing side of channels and sloughs, it is questionable whether the creation of marshes and lakes helps them significantly.

Page 267, Second Paragraph, Fifth Sentence - The wing dams were not really part of the 9-foot navigation project, but were left over from earlier attempts to channelize the Mississippi River. They were accidentally covered to the depth which prevents complete siltation behind them and provides good fish habitat. Rock bass are not one of the main panfish species in the fishery catch; however, they are quite numerous in areas without rock rubble. Wing dams are important to walleye, however.

Page 268, First Paragraph - This paragraph is not clear as presently written. The implication is that Lake Onalaska has been cut off from the main channel water supply due to increased aquatic habitat. This implication is not correct since Lake Onalaska has been separated from the main channel by natural islands and dredge spoil disposal practices.

Page 268, Second Paragraph, First Sentence - It is suggested that this sentence be changed to read: "Dredge spoiling has created sand beaches along the main

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channel of the river" since the question of the aesthetic appeal of dredge spoil islands is moot. While these dredge spoil areas may be appealing to those people who choose to use them for recreation, other people such as hunters and fishermen may find them very undesirable. It would seem that sand beaches could be provided and maintained without incurring the adverse impacts of the present dredge spoil disposal practices. Sand beaches and bars do occur naturally on unimpounded rivers such as the Lower Chippewa River and Lower Wisconsin River. These areas also receive heavy recreational use.

Page 268, Second Paragraph, Second Sentence - Only a small amount of the dredge spoil areas are accessible from the main channel of the Mississippi River since much of the dredge spoil material is deposited in backwater marshes and sloughs. The recreational use of some of the dredge spoil areas is discouraged by the highly eroded and steep edges, extreme height to which the dredge spoil material is placed (sometimes in excess of 30 feet), and the lack of vegetation.

Page 269, Second and Third Sentences - We wonder what the invention of water skiing on post impoundment Lake Pepin has to do with the recreational aspects of the operation and maintenance of the 9-foot channel project since Lake Pepin is a natural lake and would have existed without the locks and dams. This appears to be another example of attempting to gather as many beneficial effects of the project as possible while de-emphasizing the adverse impacts of the project.

Page 269, First Paragraph, Sixth Sentence - It should also be added that the aesthetic appeal and recreational potential of the river have been reduced due to the Corps dredge spoil disposal practices.

Page 269, First Paragraph, Seventh Sentence - It would appear that some consideration should be given to the priority of locking through recreational craft on busy weekends and holidays.

Page 270, First Paragraph, First Sentence - The statement is made that "the project removed farming operations from a high risk flood area". The project has quite possibly meant that areas which previously may not have been flooded are now subject to inundation due to the loss of channel storage below the existing pool elevations. Therefore, while land use has been transferred from areas which previously were adjacent to the channel, other land use now adjacent to the pools may in many cases be subject to inundation.

Page 270, Second Paragraph, First Sentence - The existence of the pools has not led to a direct effect on cooperation between state natural resource departments in the management of fish and wildlife resources. It would be no more troublesome to negotiate reciprocity between adjacent states if the river were not impounded. In fact, it may simplify rule-making and increase management efficiency.

Page 270, Third Paragraph - It is implied that public ownership of lands in the river bottoms is due to the 9-foot channel project. While this may be the case due to the manner in which the project was initiated, such public ownership of the bottom lands is certainly not dependent upon the maintenance of a navigation channel in the river and could be accomplished separately.

Page 271, First Paragraph - This section falls far short of what it should be. There is much information in the text of the Environmental Impact Statement which could be used to expand this section. However, even if this is done, the lack of a benefit/cost ratio approach would still cast doubt upon the credibility of the economic analysis.

Page 273, Top of Page - It could also be stated that the river bottoms would have fewer permanent shallow marsh and surface water areas, and that the sloughs would eventually fill in and not be as free running as before; however, time would repair some of this damage. Deer habitat would eventually improve, and deer, otter and raccoon would probably increase. On the other hand, mink, muskrat and some fish species, such as carp and sheepshead, would decrease. American lotus beds would eventually decrease. The present feeding and resting habitat for most waterfowl would be diminished while wood duck nesting would increase. If the present public lands would remain in public ownership, some excellent wilderness values would eventually develop. However, the presence of the wing dams and closing structures would continue to channelize the river and eventually negate short-term improvements.

Page 273, Second Paragraph - An economic benefit which could accrue due to halting the operation and maintenance of the 9-foot channel would be a savings to the taxpayers. Railroads would probably experience an increase in traffic. Capital expenditures would be necessary to enable the railroads to service the increased transportation demand. This cost would be passed along to the consumer and diminish the effect of the decrease in Corps expenditures.

Page 274, Second Paragraph - The statement is made that water carriers enjoy the advantage of lowest cost movement of bulk commodities for long distances. However, no information is provided on why this is the lowest cost alternative. Obviously, the subsidy being provided to water carriers in the form of current dredge spoil disposal and other maintenance practices without appropriate user costs has led to part of this advantage. It would seem appropriate that the impact statement should provide some cost estimates and reasons why user fees cannot be charged to barge traffic. If the taxpayer subsidy for navigation on the Mississippi River were removed, competition would develop and other transportation modes such as railroad and trucks might be more economically feasible.

Pages 274 to 283 - The comparison of the relative economies and field consumption rates between barge traffic and rail traffic appears to be somewhat slanted in favor of barge traffic. A factor which should be considered is that this information is based upon past experience. Over the past 30 to 40 years, barge navigation and air traffic have benefited from governmental subsidies. Meanwhile, the railroads have not been able to run at peak efficiency due to a general lack of capital which has led to a lack of investment in new equipment and more modern facilities. In addition, the analysis has not taken into account the true environmental costs of the past dredge spoil disposal procedure which has resulted in the deposition of material in areas that are susceptible to rapid erosion, in the filling in of wetlands and other environmentally sensitive areas, and in the general practice of spoil deposition in the floodplain which if allowed to continue for an extended period of time, could lead to economic losses due to increased flooding.

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It is unclear whether the energy consumption by barge traffic takes into account that energy which is expended to maintain the navigation channel including energy required to operate the lock and dam system and energy required to dredge and clean out the channel on a continual basis. It is also not clear whether the energy intensiveness for waterway users includes all forms of navigation, such as ocean going vessels, vessels on the Great Lakes, and barge traffic on the Mississippi River. It would be assumed that the energy intensiveness of barge navigation on the Mississippi River would be higher than the energy intensiveness for other forms of navigation since the barges have to negotiate many bends in the river, have to oftentimes make double lockages, and at times have to wait for passing tows or for other tows to lock through. The inclusion of these factors in the economic caluclations could cause an apparent cost differential between barge traffic and rail traffic to decrease or in some cases may actually reverse itself.

Page 275, Item d. - The Rand Corporation found that the energy intensiveness for waterways was 500 BTUs per ton-mile while rail was 750 BTUs per ton-mile. On the other hand, information published in the "Railway Age" points out that rail traffic has an energy intensiveness of 536 to 791 BTUs per ton-mile and barge traffic has a energy intensiveness of 540 to 680 BTUs per ton-mile. Thus, since these data appear to conflict, we feel that this section should be deleted or clarified.

Page 277, First Paragraph - An attempt is made to show that the railroads could not possibly handle the additional load if barge traffic were to cease on the river. No attempt is made, however, to show what portion of this load the rail system could handle. It would seem approriate that a portion of this section should include a complete analysis of the rail industry's capabilities and possibilities for handling the additional work load involved. This superficial analysis continues in the second paragraph of page 280 where the statement indicates that, with the current shortage of rail cars and the heavy demand for them, it is unlikely that manufacturers could provide any additional cars. It has been repeatedly stated that the same situation exists for barges. This would seem to indicate a lack of ability on the part of barges to handle the added projected work load.

Page 281, First and Third Paragraphs - It is indicated that towboats used to propel the barges draw eight to nine feet of water at optimum peak efficiences. It is also indicated elsewhere that squat can increase this depth another foot and a half and that the tows can only draw significantly less than eight feet if fuel and water are removed from the hull of the tows. As a result, there is no acceptable alternative to the 9-foot channel. Since Congress has only authorized a 9-foot channel, it is conceivable that only a 9-foot channel must be provided by law. It would seem that the barge companies are relying on the Corps to, in fact, over-dredge the channel so they can continue to operate in a more economical fashion. Thus, the Corps' continued practice of over-dredging has led to a system of navigation which now completely relies on over-dredging.

Page 283, First Paragraph - Rather than being a simple example of conflicting information, these points should have been clarified in the Draft Environmental Impact Statement. On page 275, it is stated that the railroads require a greater consumption of energy to move an equal volume and equal distance compared to barge transportation. On page 278, it is stated that diesel trains produce 1.5 times as much air pollution as tugs and barges based on energy intensiveness ratios. With these conflicts in information and data, it is our position that neither of these statements can be made.

Page 293, First Sentence - It should be stated that these acreages include only what shows above the normal pool level and not the material that has been washed into backwaters and decreased water depths directly through filling or indirectly through cutting off of flows.

Page 293, Second Paragraph, First Sentence - It should be stated that the dredge spoil circles are cut off in the vicinity of the main channel border because of erosion.

Page 294, First Sentence - Most of this sand would move down the main channel as bed load and would not enter side channels and backwaters if it were not dumped there by dredge spoil disposal practices.

Page 295, First Paragraph - An attempt is being made to back away from any real effort at quantifying the adverse impacts of the channel maintenance program. The statement is made here and elsewhere that follows this basic line: adverse impacts such as the filling of guts of important sloughs, sedimentation of backwater areas and the blocking of flows to these important backwater areas is occurring. It is not known, however, how much of this problem is being contributed by dredge spoil disposal, although it probably does have some affect on these matters. One of the purposes of an impact statement is to define the specific adverse impacts of the project. This has not been done and as such it appears that the purpose and intent of the impact statement has not been realized. Cost estimates in this report are applied only to construction work itself and not to adverse impacts. As such, the Environmental Impact Statement does not give proper attention to a program that is best for the long-term public interest, taking into account all considerations, but arrives at the most economical way from the construction standpoint in which to perform maintenance dredging. An excellent manner by which to investigate whether dredge spoil disposal or "natural processes" are more significant in channelizing the river would be to remove the dredge spoil from the floodplain completely in order to see what happens. At any rate, continued dredge spoil disposal in the floodplain is certainly of no assistance in ameliorating this problem.

Page 295, Second Paragraph, Second Sentence - We submit that large volumes of dredge spoil material have and continue to affect the backwater areas of the Weaver Bottoms rather than "small volumes of material can, and do, effect such large backwater areas as the Weaver Bottoms in Pool 5."

Page 295, Last Sentence - The stabilization of the hydrologic system and increased hydraulic efficiency of the main channel can be equated to a direct measurement of a reduction in backwater area, decreased water quality, and a reduction in general fish and wildlife habitat quality for the entire Mississippi River system.

Page 297, Third Paragraph - While it is true that the flow patterns are being modified as the main channel becomes increasingly efficient, the ultimate conclusion is that the most engineeringly efficient channel would be one that would fill in all side channel areas and provide a straight channel from Minneapolis to New Orleans while providing capacity to handle the regional flood flow. Also in this paragraph, it is stated that the elimination of flow in backwater areas is caused by roadway construction, natural sedimentation, encroachment in the floodplain, or the disposal of maintenance dredge spoil. However, no quantification is provided on how much this particular channel maintenance project contributes to this problem. In the last sentence of this paragraph, it is indicated that it is a practice to avoid placing material in the feeder channels of backwater areas; however, this has occurred in the past. Unfortunately, the cumulative nature of dredge spoil disposal and the movement of dredge spoil materials have had the net effect of depositing dredge spoil materials in these areas anyway. Since 2,600 additional acres of habitat must be used in the future for the status quo alternative, it will become increasingly difficult if not impossible to avoid such areas using present dredge spoil disposal methods.

Page 298, First Paragraph, Last Sentence - We would like to know why data regarding the erosion of dredge spoil material and its implication in the blockage of sloughs is inconclusive at the present time and why additional studies have not been proposed?

Page 298, Second Paragraph - The statement that people have indicated that placement of dredge spoil is resulting in increased flood stages and that hydrologic studies by the Corps have indicated that increases in the Mississippi River profile due to sedimentation from Corps dredge spoil disposal is expected to be very small, is not an adequate treatment of the full effect of dredge spoil disposal in a floodplain. While we would agree that an analysis on a spot by spot basis of any one particular spoil site would probably not show any significant increase in the flood stage at that location, the cumulative effect of the channelization from continuous spoiling that restricts the flood flow and stops the flood water from spreading through backwater areas and over the entire floodplain, when analyzed on a reach and double encroachment basis which is required under Wisconsin Law, would certainly indicate an increase in flood stages. This practice of filling hundreds of acres in the floodway with dredge spoil material strikes against the very concept of good floodplain management and land use practices. The fact that this is being done by the Corps of Engineers, who are responsible in part for floodplain regulations on the Federal level, makes it impossible to enforce similar regulations in the private sector. This practice of dredge spoil disposal in the floodway is in direct conflict with the Water Resources Council's recommendations and with the Federal Executive Order 11296.

Page 300, First Paragraph, Third Sentence - It should be stated that the periodic fishkills in the backwaters below the dikes and spillways is a result of improper engineering design on the original project. As such, the aeration structures are not a part of the original project and are more intended to correct original deficiencies in design. Additional impacts on water quality which were not considered include: pollutants from bilge water, oil spills and other material spills, and prop wash from barges (aerial photos taken by this Department in the summer of 1973, indicate that turbidy extends downstream from barges for a length of a mile or more). A significant effect of the operation and maintenance of the 9-foot channel which has not been considered is the effect of dredge spoil disposal, erosion, and subsequent redeposition of dredge spoil material in the cutting off of backwater areas and the subsequent eutrophication and stagnation.

Page 301, Impacts of Dredging on Water Quality - It is not stated what methods were used for determining the effect of dredge spoil disposal on water quality, for instance, were Standard Methods used? The U.S. Environmental Protection Agency has prepared a handbook for evaluating the quality of bottom sediments. The particular study that was done on Pool 8 does not appear to have followed the EPA methods for analysis of sediment materials.

Page 304, Impacts on Land Use - The implication that the Corps' creation of additional land in the middle of the floodway would be beneficial provided that local municipalities or states then effectively zone this area to inhibit development of homes and businesses in flood prone areas is not adequate. The program of floodplain zoning is made more difficult by the Corps' creation of lands which people may then wish to utilize.

Page 301, Third Paragraph - We wonder why aeration facilities were not installed at L&D 9 according to the recommendations of the Bureau of Sport Fisheries and Wildlife?

Page 303, Second Paragraph, Second Sentence - It should be clarified that a spoil material eroded by wind and water affects areas far away from as well as close to the spoil site.

Page 306, Fourth Paragraph - It is indicated that 2,370 acres of spoil sites have been identified which constitutes about 1.4% of the surface water area of all the pools. This acreage would be much larger since the spoil that was underwater and the spoil which was obscured by woody or marsh vegetation was not included. The Draft Environmental Impact Statement indicates that a number of backwater areas have been adversely affected by dredge spoil disposal; however, it is not indicated how much natural sedimentation has added to this problem. No quantification is provided on the amount of damage which was caused by the disposal of dredge spoil materials. The use of 1940 maps for the determination of dredge spoil sites disregards approximately 20 million cubic yards of material disposed of between the years of 1933 to 1940, as shown on Exhibit 76. Thus, dredge spoil sites as indicated on the 1940 maps would have been shown as existing sites and disregarded in the survey.

Page 307, Third Paragraph - The statement that 45% of the spoil deposit sites are vegetated to a "significant degree" with bottom land woods and brush is meaningless. The quality of the dredge spoil sites for wildlife habitat cannot be ascertained by the use of such vague and general descriptions. Much of this cover can be attributed to the presence of existing trees which have been spoiled to their crowns and by the invasion of cottonwoods and willow. This does not give any information, however, on the occurrence of ground cover which is valuable for wildlife habitat and for erosion protection.

Page 307, Second Paragraph, Second Sentence - It should be noted that the areas which are indirectly affected by spoil deposition can be rather extensive. A good example is the spoil deposits located at the mouth of Indian Slough at approximately River Mile 759. Examination of backwater areas in this region by comparing 1939 aerial photos to recent aerial photos shows an extreme change in habitat and sedimentation. While all of the sedimentation cannot be blamed on dredge spoil disposal, it appears that a good share of the sedimentation is a direct result of it. The indirect results of loss of water circulation in backwater areas has not been adequately considered in this section.

Page 309, First Sentence - It should be clarified which species of trees inhabiting the river bottoms are capable of forming adventitious roots. According to Curtis (1959), the leading dominants of the lowland forest are silver maple, American elm, green ash, black willow, cottonwood, river birch, and swamp white oak all of which are wind pollinated and have seeds or fruits which are wind disseminated. All of these species produce stump sprouts; however, none have a well-developed ability to grow from root sprouts or to form dense vegetative clumps.

Page 310, First Paragraph, Fourth Sentence - It is important that dredge spoil sites be revegetated in order to prevent wind and water erosion.

Page 310, Second Paragraph, Third Sentence - We would like to know if revegetation studies are going to be undertaken on dredge spoil islands.

Page 311, Sixth Sentence - We would like to know what types of wildlife habitat are created by ecological succession of vegetation on dredge spoil sites. Inspections of dredge spoil sites in the past five years, including some sites that were two to four years old, indicates only transient use by wildlife other than turtles and songbirds. Most spoil sites checked were virtually devoid of wildlife.

Page 311, First Paragraph, Second Sentence - Dredge spoil sites are not important for the provision of grit to birds. Grit is available on any terrestrial site in the bottom lands including roadways, gravel pits, and natural shorelines.

Page 312, Paragraph One, Third Sentence - The extent of killing of floodplain trees and the length of time they remain as possible nesting sites for herons and egrets should be examined and evaluated along with the assessment of any possible damage due to dredge spoil disposal to existing rookeries. The alteration of habitat almost always results in new habitat where something else will live. The question which must be raised is the change desirable or necessary? As the heron rookery illustrates, the habitat created could be unnecessary for certain uses. More nesting would not necessarily mean more birds or turtles if other limiting factors were more influential. For example, eagles may already have a plentiful supply of available perches without the killing of more trees to increase the supply.

Page 312, Second Paragraph, Second Sentence - The aquatic habitat is not only restricted to the spoil site; however, this is the most obvious effect. Losses or changes in aquatic habitat of backwater areas are indirectly affected by spoil deposition which results in sedimentation and disruption of flows.

Page 313, First Paragraph, Third Sentence - Many lesser appreciated forms of aquatic animal life are important to ecological relationships which are not yet fully understood.

Page 313, First Paragraph, Last Sentence - Protecting waterfowl brooding and nesting areas which are utilized for food and cover are important in this respect.

Page 315, First Paragraph, Second Sentence - It is unusual that no discussion has been undertaken on the decrease of wild rice beds and American lotus beds both of which were extensive during the 1950's. Both of these species have apparently declined considerably in recent years.

Page 316, Second Paragraph - This paragraph is not clear with respect to the source of turbidity which has had a significant effect on the absence of bottom organisms. If the turbidity at the cutterhead is not significant, the only other source of turbidity would come from the discharge pipe. Where excessive turbidity had an adverse effect on bottom organisms, the discharge would be considered to be a pollutant.

Page 318, First Paragraph, Last Sentence - We would like to know where the spoil that "washed out" went? This is a prime example of secondary movement of dredge spoil materials resulting in indirect adverse effects such as the blocking of side channel flows which would eventually lead to channelization of the river.

Page 321, Second Paragraph - This is a comparison of two entirely different ecological conditions; a) a slough in a natural river condition which had been affected by the 4½ and 6 foot navigation structures resulting in the deposition of sediments before the installation of L&D 6.

When the water in the pool raised, the slough became a settling basin for sand from the upstream, part of which likely came from the numerous dredge spoil sites below Winona and Homer, Minnesota. Although the filling of Gibbs Slough may not be completely due to dredge sand, it is certainly the result of the construction of L&D 6 inundating the area. b) the same slough after it had been ecologically altered by impoundment and subsequent sedimentation. The implication that Gibbs Slough would have filled in even though left in a natural condition does not necessarily follow since it was changed from a running slough to a backwater lake. In any event, whatever happened to Gibbs Slough does not change the fact that dredge spoil is environmentally damaging where it occurs.

Although some sedimentation of Gibbs Slough may have occurred normally under unimpounded conditions during flood stages, it should be recognized that certainly any decreases in sedimentation would be another side benefit of stopping erosion before it occurs in such areas as the Chippewa River.

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Page 324, First Paragraph - As discussed previously, most of this natural sedimentation is due to the presence of the locks and dams which resulted in an increased water depth and decreased water velocities causing a net deposition of sediments in areas where the depth was previously maintained by scouring.

Page 324, First Paragraph, First Sentence - It should be mentioned that this area is one of the most extreme examples of river channelization due to dredge spoil disposal in the whole St. Paul District.

Page 324, Paragraph Three, Second Sentence - We would like to know if these studies will be initiated?

Page 325, Paragraph Two - Safety hazards from commercial tows are not restricted to only the vicinity of the locks. Lighting of barges at night is frequently inadequate for safe visibility.

Page 325, Second Paragraph, First Sentence - These beaches, particularly when located near to swift currents on the channel side, may present hazards to swimmers and water skiers. At these locations, the bottom may drop off rather rapidly and swimmers may be caught in swift currents. Another safety hazard which should be considered is that the edges of freshly deposited spoil sites are very soft. People stepping on these new spoil sites have been known to sink several feet into the dredge material.

Page 328, Remedial, Mitigative, and Protective Measures - On page 329, it has pointed out that resource agencies have been contacted regarding the location of dredge spoil sites, and that the placement of spoil in preferred areas costs about $100,000 annually. There is some question regarding the validity of this statement since dredge spoil material has continually been deposited in "sensitive" areas. The Wisconsin Department of Natural Resources and the UMRCC have had the choice of few alternatives for dredge spoil disposal, all of which were not acceptable from a resource protection standpoint. In part, the decision to rescind the 1969 dredge spoil survey was based on its misuse. The limits of available dredging equipment and the present mode of operation constitute the majority of the problem.

Page 331, First Paragraph - This statement in effect states that the Corps cannot stop maintaining a 9-foot channel that has been authorized by Congress. Many of the adverse impacts, such as the change of aquatic habitat to sandy shoals, which are claimed to be unavoidable adverse impacts are not necessarily so. Under the present method of dredge spoil disposal, this would be true. With proper modifications, however, these adverse environmental impacts could be mitigated or avoided. This could be done without sacrificing the authorized purpose of the project. Thus, maintenance of the 9-foot channel could continue without the present destructive methods used in the disposal of dredge spoil materials.

Page 331, Second Paragraph, Last Sentence - Assuming that the dredge spoil sites receive considerable public recreational use, it could not be considered as an unavoidable adverse impact of the operation and maintenance of the 9-foot channel. Therefore, this sentence should be changed or deleted from this section.

Page 332, Second Sentence - The issue here is not floodplain construction or the natural movement of sedimentation, but the depositing of dredge spoil material and its secondary movements. As a result, the real questions remain unanswered. The purpose of this Environmental Impact Statement should have been to evaluate the environmental impacts of the present mode of operation and the various alternatives. Its purpose should not have been to report that nobody knows what is happening. The logic behind many of these vague statements seems to be that because there is some habitat loss which would occur without dredge spoil disposal, there is no need to prevent habitat loss which is directly caused by the present method of dredge spoil disposal.

Page 332, First Paragraph, Second Sentence - It should not be implied that there would be no sand beaches or sand bars without the present method of dredge spoil disposal.

Page 332, Second Paragraph - A statement is made that improperly designed confined spoil areas would take up large areas of valuable biological bottom land habitat. Certainly, confined spoil areas would take up no more than what is presently taken by unconfined disposal, and if properly done, would in fact include less destruction of valuable habitat. These confined spoil sites could still retain aesthetic appeal.

Page 333, Third Paragraph, Second Sentence - Oil spills and spills of other hazardous materials are a related factor to the operation of maintenance of the 9-foot channel project. The more tips that barges make up and down the river and the larger the capacity of the barges, the greater the potential environmental damage. It is also known that barge movement creates a considerable plume of turbidity. Barge traffic and heavy recreational use contribute to other unavoidable environmental impacts such as erosion of banks, increased congestion on the Mississippi River, and a higher potential for accidental collisions.

Page 335, Alternatives - This section is very repetitious and too general to enable the reader to visualize the adverse and beneficial environmental impacts of each alternative and the relative merits of each.

Page 335, Third Paragraph, First Sentence - The statement is made that consideration of the alternative of discontinuing the operation and maintenance of the 9-foot channel is not considered as a reasonable alternative to the present operation and maintenance activities since it would have such a great impact on the socio-economic and natural setting. The alternative of discontinuing this project rests with Congress, not with the Corps of Engineers. The Corps should then provide pertinent facts to the Congress in order to make a rational decision. The major impacts which could be attributed to the abandonment of the project would be the loss of investments in existing facilities both as a part of the navigation project itself and related port facilities along the river. One obvious alternative to barge traffic would be rail traffic, and unless the terminal facilities were presently developed in such a manner that they could be served by rail, significant additional investments would have to be made to either modify these facilities or to relocate them. Thus, the overall question of the environmental impact of this proposal is largely dependent upon the competition between rail and barge traffic. If rail traffic became more competitive due to a proper cost accounting of total environmental costs related to spoil disposal for the navigation project, the overall negative impact on the local economy could be significantly reduced.

This is one of the major questions in deciding whether such a project should be continued at the present time. The reluctance of the Environmental Impact Statement to further address this issue is unfortunate.

Page 336, First Paragraph, Second Sentence - The operation and maintenance of a navigation channel with lesser depths would reduce the frequency at which maintenance dredging had to be performed. This would be a result of the decreased reservoir capacity leading to a decreased trap efficiency. A reduction in the depth of the channel would require barges of lesser draft or smaller loads on existing barges. This would probably lead to greater costs and fuel consumptions per ton mile.

Page 340, First Paragraph, Last Sentence - Such an accelerated land treatment program should be quantified. In other words, how much would it cost to initiate an accelerated program to reduce sheet erosion in the study area by 15 to 30%? Such a study should include cost estimates.

Page 341, First Paragraph, First Sentence - The improper location of sedimentation basins could cause more environmental damage on the streams where they were located then they would prevent downstream.

Page 342, First Paragraph, Fourth Sentence - It is hard to believe that the long-term effects of such a land treatment program would not be beneficial even though it may be cheaper now to let it erode and dredge out the sand in the Mississippi River. From the long-term standpoint, such a proposal may be the most economically feasible.

Page 343, First Paragraph, Second Sentence - Conversely, watershed land treatment measures would be expected to decrease runoff rates thereby decreasing the bedload transport in gullies and streams.

Page 343, Second Paragraph, Third Sentence - In general, watershed land treatment measures would in fact reduce both the quantity of runoff due to increased infiltration and the peak volume of runoff due to an increased time of concentration in the watershed. Therefore, it would be expected that increased scouring of gullies and streams would not necessarily result nor would the extent of scouring be equal to the lesser amount of sediment inflow attributed to reduced sheet erosion.

Page 344, Second Paragraph, First Sentence - The statement is made that watershed land treatment efforts upstream from dams on tributaries would probably be wasted as far as their effect on reducing maintenance dredging requirements. This, of course, is an obvious statement. The logical choice would be to institute land use controls and land treatment practices downstream from the dams on the tributaries. A combination of the existing tributary dams along with a reduction of sediments introduced to the stream should lead to a reduction in bedload in the Mississippi River itself. While the channel may develop a greater capacity to scour itself out in response to a reduced sediment inflow, the significance of this change is not clear. The "hunger" of water for sediment is generally related to the suspended or collodial sediment load and not to the coarser fraction which is carried along as bedload. A reduction in the inflow of coarse grained sediments would not necessarily lead to increased channel erosion of any great significance. In addition, the continuing deposition of bedload within the channel indicates that at the depth called for in the navigation project, the river is presently carrying a load of sediment greater than its capacity. If the present system were in relative equilibrium, maintenance dredging may not be required at all. Therefore, the argument that reduction of sediment inflow would automatically be compensated for by increased channel scour appears to be incorrect. In addition to reducing the sediment load in the Mississippi River, watershed land treatment measures could be expected to improve the quality of smaller tributary streams.

Page 346, First Paragraph, First Sentence - The alternative of using watershed land treatment practices is discounted. It appears that this alternative has not received the full study which it deserves; rather, the desire to continue along existing institutional guidelines has become evident at this point. The benefits from land treatment go considerably beyond a simple reduction in the frequency of dredging of the navigation channel, and such practices may be desirable in their own right independent of the navigation project.

Page 346, Second Paragraph, First Sentence - The Draft Environmental Impact Statement indicates that implementing a comprehensive regional land treatment program would be impossible. Certainly an incentive and penalty program in cooperation with Federal and State governments would be extremely fruitful and would not necessarily have adverse effects on agricultural production. In fact, such a program may improve agricultural production. History would seem to indicate that proper erosion control measures have led to more productive farming not less productive farming. Any loss of acreage would be more than offset by increased production on the remaining acreage. It is also indicated that the total economic effects of a comprehensive land treatment program could not be ascertained without more detail studies. This is another indication that the Draft Environmental Impact Statement is deficient in the areas of significant adverse impacts and viable alternatives. Such a land treatment program would be expected to result in a decrease in environmental losses.

Page 348, Second Sentence - While the location of emergent wing dams and closing structures may make the main channel more hydraulically efficient, they would be expected to also have an adverse effect on backwater areas, marshes, and sloughs. Examples of this type of structure on the Missouri River provides an insight into the environmental impact of this alternative.

Page 350, Paragraph One, First Sentence - Thus, this alternative would result in essentially the same effect as present dredge spoil disposal practices of depositing large amounts of dredge spoil material adjacent to the main channel.

Page 350, Second Paragraph - It is stated that "Trapping bedload sediment from tributary streams could greatly reduce the amount of coarse material reaching the Mississippi River." Again it is stated that such a program would probably reduce the amount of maintenance dredging needed, but it is not known for sure how much. This is another indication that the Draft Environmental Impact Statement should provide additional quantification of this alternative.

Page 351, Fifth Paragraph, First Sentence - It should be pointed out that spoil containment by diking, as well as revegetation, may be important in areas where removal from the floodplain was ruled out for some reason.

Page 352, First Paragraph, Third Sentence - The use of sand dikes for spoil containment structures are obviously less expensive than other containment structures, but they are also more vulnerable to rupture or collapse. They could easily rupture and allow the spoil material to discharge into adjoining wetland areas. One accidental break in the dike could negate any benefit which may accrue from confinement of the spoil material. Riprapping of spoil sites would also provide good fish habitat. The high cost of riprapping may encourage removal of the spoil material from the floodplain.

Page 357, Second Paragraph, First and Second Sentences - It is stated that current federal regulations require the confinement of dredge material when it is determined to be polluted. There is no indication that the guidelines established by the U.S. Environmental Protection Agency for analyzing the chemical parameters of bottom sediments was used. EPA guidelines call for the evaluation of the following parameters: percent volatile solids, oil and grease, COD, total nitrogen, total phosphorous, lead, mercury, and zinc. Of these parameters, only two are indicated on Exhibit 187. There is no indication whether the methods for testing the water quality before, during and after dredging followed standard methods. We would also like to know who determined that the dredge spoil materials were not polluted since the EPA normally makes this determination.

The requirement for contained disposal facilities is limited to the great Lakes as stated in 33USC, Section 1165a(h) "This section, other than subsection (i), shall be applicable only to the Great Lakes and their connecting channels." 33USC, Section 1165a(i) states that "The chief of engineers, under the direction of the Secretary of the Army, is hereby authorized to extend to all navigable waters, connecting channels, tributary streams, other waters of the United States and waters contiguous to the United States, a comprehensive program of research, study, and experimentation relating to dredge spoil. This program shall be carried out in cooperation with other federal and state agencies, and shall include, but not to be limited to, investigations on the characteristics of dredge spoil, and alternative methods of its disposal. To the extent that such study shall include the effects of such dredge spoil on water quality, the facilities and personnel of the Environmental Protection Agency shall be utilized." The content of this Draft Environmental Impact Statement appears to fall far short of the requirements stated in this subsection.

Section 101(b) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) states "It is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of states to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources. . . . " Section 313 of the Federal Water Pollution Control Act Amendments of 1972 states "Each department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal government (1) having jurisdiction over any property or facility, or (2) engaged in any activity resulting, or which may result, in a discharge or runoff of pollutants shall comply with Federal, state, interstate and local requirements with respect to control and abatement of pollution to the same extent that any person is subject to such requirements, including the payment of reasonable service charges." Chapter 147.015(3), Wisconsin Statutes, defines pollutant as "Any dredged spoil, solid waste, incinerator residue, sewage, garbage, refuse, oil, sewage sludge, munitions, chemical wastes, biological materials, radioactive substance, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water." Tentative regulations for Federal dredging projects in navigable and ocean waters as stated on page 6113 in the Federal Register (Volume 39, Number 34-Tuesday, February 19, 1974) states "Section 404 of the Federal Water Pollution Control Act (33USC1344, 86 Stat. 816) authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits, after notice and opportunity for public hearings, for the discharge of dredged or fill material into navigable waters at specified disposal sites. The selection of disposal sites will be in accordance with guidelines developed by the Administrator of the Environmental Protection Agency (EPA) in conjunction with the Secretary of the Army. Furthermore, the Administrator can prohibit or restrict the use of any defined area as a disposal site whenever he determines, after notice and opportunity for public hearings, that the discharge of such materials into such areas will have an unacceptable adverse effect on municipal water, supplies, shellfish beds and fishery areas, wildlife or recreational areas." Thus, it would appear that in order to determine if the dredge spoil materials violated water quality standards, it would be necessary to follow EPA guidelines for the analysis of bottom sediments and to obtain an opinion from the Environmental Protection Agency as to whether the bottom sediments could be considered as being polluted.

Many of the existing spoil deposit sites are located in the floodway in open water areas and wetlands. Section 30.12, Wisconsin Statutes, prohibits the placement of fill materials below the ordinary high water mark of a navigable water. Wisconsin Administrative Code, NR 115 and 116, prohibits the placement of fills within the floodway. These regulations are intended to protect the public's interest in navigable waters, fish and wildlife resources, and to protect water quality. It would appear that Wisconsin regulations for controlling fills below the ordinary highwater mark should be given greater consideration since the Federal Register (Volume 39, No. 34--Tuesday, February 19, 1974) states on page 6114 that "State regulatory laws or programs for classification and protection of wetlands will be given great weight."

The indiscriminate deposition of dredge spoil materials within the waters of the State of Wisconsin conflicts with state law and state policy for the protection of fish and wildlife resources, wetlands, and public rights to navigation. Even though dredge spoil material was to be removed from the floodplains of Wisconsin, the resources of this state would still feel the effects of spoil deposition in the upstream areas of Iowa and Minnesota since the waters of the Mississippi and the fish and wildlife resources therein do not follow state boundaries. The larger particles from upstream dredging projects would be deposited in spoil disposal sites; however, the finely grained particles and colloidal material would be carried downstream to settle in backwater areas. As a result, the fish and wildlife resources and water quality of the State of Wisconsin would continue to be adversely effected.

Page 359, Second Paragraph, First Sentence - The value of stabilized spoil sites may be considerably less than what it had been originally, particularly if it had been aquatic habitat. Just how significant this new habitat would be for increased wildlife is a question which must be answered particularly in light of the frequency of addition of new spoil to the site. Natural plant succession on the spoil areas is extremely slow due to a lack of nutrients, moisture, and stability. In many cases, natural revegetation cannot occur due to repeated desposition of spoil. These disposal sites serve as a constant source of sediments for the downstream areas particularly during periods of high water. The use of top soil and fertilizer on the spoil sites has been considered to lend fertility to the sterile sand areas. However, if the spoil area is exposed to high water before the vegetation is firmly established, the erosive force of the water could carry the topsoil downsteam. This could provide an additional source of sediments and nutrients to backwater areas. Therefore, the timing of such procedure is extremely important.

Page 362, Third Paragraph, Item a - The timing on the application of fertilizers would be critical since high waters or heavy rains could wash the nutrients off the spoil sites and into the river adding additional nutrients to an already overly fertilized body of water.

Page 364, Second Paragraph, Third Sentence - The use of an asphalt emulsion for mulching of dredge spoil sites has been considered; however, the use of such an emulsion may constitute a possible water contaminant. Various other techniques have been discussed which would render the existing spoil deposit sites less damaging to the environment. The alternative of remote disposal and selective placement have also been considered for future dredging operations; however, these methods have not considered whether they would be in conflict with State statutes or floodplain zoning regulations. Little attention has been paid to the possible removal of existing dredge spoil sites from the Mississippi River floodplain.

Page 366, Item i - Dredge spoil material should not be deposited on the inside of river bends since these areas usually are deep and provide good fishery habitat. Due to erosion and scouring, this spoil material would wash away in a very short time. The placement of dredge spoil material on the lower end of main channel islands would also contribute to secondary movement and the gradual closing off and isolation of backwater areas.

Page 367, Item d - It would seem fairly easy to determine the amount of material which would be eroded from dredge spoil sites particularly since the volume of material is known from the size of the dredge cut.

The rate of settling and the amount of material which has been eroded could be periodically determined over time by using standard surveying techniques. Since the accusation that the dredge spoil material does erode away is not new, it seems rather incredible that the Corps has not undertaken the study of at least a few dredge spoil sites to determine if there is indeed secondary movement and erosion of dredge spoil sites. Fiel examinations at dredge spoil sites does show that there is erosion of the spoil by water and wind. It has been brought to our attention that unquantified estimates by the Bureau of Sports Fisheries and Wildlife reveal that up to 70 percent of the dredge spoil material may be lost to erosion by wind and water.

Page 368, First Paragraph - We would like to know why there is no established program to encourage vegetative growth on dredge spoil sites since this is an established and accepted land conservation practice.

Page 370, First Paragraph - The problem of revegetation would still exist in areas where there is continued redeposition of spoil material. In these instances, vegetation would just get started about the time that it would be spoiled upon again. As a result, revegetation would not even be a short-term solution.

Page 370, Second Paragraph, Fourth Sentence - The relocation of dredge spoil at fewer but larger spoil sites would require a close examination of any such sites. In many instances, valuable backwater habitat would be destroyed rapidly by direct dumping instead of slowly from secondary movements of spoil by river currents and wind. Backwater habitat relatively undisturbed by developments and barge traffic would be traded off in order to protect main channel areas which have been heavily influenced both by commerical and recreational developments.

Page 371, Second Paragraph - The call for coordination and constructive roles in the placement of dredge spoil material is fine in theory, except that State and Federal natural resource agencies have attempted to cooperate with the Corps of Engineers in the placement of dredge spoil material for the past forty years with little success. During these past forty years, there has been a continued loss of wetlands, aquatic habitat and terrestrial habitat to dredge spoil disposal.

By asking for an Environmental Impact Statement, it was hoped that the Corps of Engineers would provide the necessary leadership and foresight which is required in order to complete an acceptable Environmental Impact Statement. However, the Corps has sought to defend the status quo alternative and has not attempted to provide a clear and concise description of the adverse and beneficial impacts of the operation and maintenance of the 9-foot channel project. It is intimated that the State resource agencies have been uncooperative, are not understanding of the problems, and misunderstand the dredging situation and effects on the river. By the same token the Corps of Engineers has been not entirely understanding of resource management problems and profess complete ignorance in the Environmental Impact Statement on the effect of dredge spoil disposal on the river.

The Corps' reluctance to provide a complete and adequate description of the adverse and beneficial impacts of the project and to provide the necessary detailed data for decision making can only lead one to believe that they too are uncooperative. Since the operation and maintenance of the 9-foot channel project is the Corps of Engineers' responsibility, it would seem essential that the Corps would provide the necessary leadership and foresight in order to bring everyone together and to propose some solutions.

Page 373, Third Sentence - It is felt that the timing of dredging operations so as not to disturb sensitive biological functions such as spawning activities and waterfowl nesting sites is an important consideration.

Page 377, First Sentence - The reopening of side channels which have become blocked with dredge spoil material and sediments could also have a beneficial environmental impact by providing more flow to backwater areas.

Page 380, Second Paragraph - In general, removal of spoil material from the floodplain is the best alternative environmentally since it involves the smallest acreage of habitat destruction due to its noncumulative nature. It is usually as cheap or even less expensive than the cost of permanent sites on the floodplain which would require the longest transport distances for spoil.

Page 382, Third Paragraph, Fifth Sentence - We would like to know how the handling and loading cost of $0.25 per cubic yard for the rehandling of materials was arrived at.

Page 383, Eighth Sentence - It is mentioned that the cost for removal from the floodplain includes the removal cost only and does not indicate the cost and availability of land for ultimate disposal. It should also be noted that nowhere is there any cost figure included for possible economic returns for resale or reuse for the ultimate public benefit.

Page 384, First Sentence - It is intimated that the removal of dredge spoil from the floodplain may not do any good if other factors are causing the filling of backwater areas. This statement appears to be a rationalization for not quantifying the adverse effects of the project itself. It is logical in this instance that if the adverse effects of the project were evaluated, the main cause of blocking flow to the backwater areas would be found to be the deposition of dredge spoil.

Page 384, Second Paragraph, Second Sentence - We wonder how it is possible to calculate unit costs for removal of dredge spoil material from the floodplain when no specific suitable or desirable areas for the deposition of dredge spoil out of the floodplain were identified. It would seem that the unit costs which were arrived at would be completely useless until this was determined since the requirements for additional plant, hauling distances, and rehandling of dredge spoil materials may be entirely different under a more factual situation.

Page 385, Second Paragraph, First Sentence - Again, it would seem necessary to identify these areas where minor changes in dredge operating procedures and where minor modifications of transporation facilities would be necessary since this would tend to decrease the unit cost for removal of dredge spoil from the floodplain.

Page 386, First Paragraph, Second Sentence - This sentence is a subjective argument which implies that protection of the Mississippi River environment is not worth the additional cost of removal of dredge spoil from the floodplain. On the other hand, if environmental benefits were included and considered in this alternative, the removal of dredge spoil from the floodplain may be the best alternative.

Page 391, Third Paragraph, Last Sentence - This sentence is very vague and is in need of clarification.

Page 393, Third Sentence - This statement does not agree with the statement on page 316, second paragraph, second sentence, where it is stated that "Turbidity generated at the cutterhead is generally regarded as insignificant." On page 395, it stated that "The amount of turbidity caused by the cutterhead could be expected to be minor due to the sandy nature of the material being dredged throughout most of the St. Paul district."

Page 394, Second Paragraph, First Sentence - It is stated that "A basic modification to the cutterhead operation such as either a swivel cutterhead or cutterhead shield could probably reduce the amount of turbidity being produced and result in a more efficient dredging operation." While on page 395, third paragraph, first sentence, it is stated that "Any basic modification to the cutterhead might result in changes of plant efficiency, but would probably not reduce significantly the turbidity at the cutterhead and any associated adverse impacts."

Page 395, Second Paragraph, Third Sentence - The ecology of the navigation channel is not well known enough to state that it is less significant in terms of plant and animal life than backwater areas. For some species, such as the pallid and the paddle fish, the main channel is important to their continued existence.

Page 397, First Paragraph, Third Sentence - The reduction of overdredging should be considered since a decreasein dredge volume of 40 percent is a considerable amount. This should be considered since overdredging may induce additional shoaling and sedimentation in the channel. We would also question whether overdredging is necessary on the entire navagation channel?

Page 400, Item c - The Draft Environmental Impact Statement indicates that certain things may require the purchase of another dredge in addition to the Thompson. This is quite possible, since the Thompson has taken over the dredging for two districts. One piece of equipment should handle one district at the most if it is to do a proper job. Thus, the Thompson has been overextended to the point where it is performing far beyond its capabilities to do the job properly.

If the Corps of Engineers were permitting work of this nature by private contractors and requiring the things that would be required of all permittees such as confinement, riprapping, proper effluent control, there is no way that a contractor with a plant of this type could possibly perform the amount of dredging which the Thompson performs during one season. Conversely, if the Thompson were to do its work, as the Corps requires private contractors to do it, these private contractors could do the dredging for less cost than the Corps, and they presently have the capability to do so.

Page 401, Second Sentence - It would seem appropriate that the spots where the amount of dredging could be reduced should have been located in this Draft Environmental Impact Statement.

Page 403, Second Paragraph, Fourth Sentence - The reason some channels do not allow the passage of shallow craft is that the closing structures are close to the surface of the water. These closing structures also restrict the movement of water into the backwater areas and allow for increased sedimentation and stagnation.

Page 406, First Paragraph, First Sentence - Since the concerns for the environmental and recreational aspects of the operation and maintenance of the 9-foot channel have been around for at least ten years, it would appear that the Corps has had adequate time to have prepared detailed studies and to have sought out appropriate alternatives for correcting these problems. It appears that the lack of authority to do anything more on the Mississippi River, other than to dredge the channel and dispose of the dredge spoil materials in backwater areas, is being used as a excuse. If the Corps would have been acting in good faith and would have been concerned about the environmental aspects of the operation and maintenance of the 9-foot channel, we would have assumed that they would have made a report to Congress explaining the problems and asking for additional appropriations and for additional authority. But as stated on the bottom of page 406, "*As yet, this and other* recommendations have not resulted in a change in such authority." This can only be interpreted to mean that the Corps has no concern for the continued degradation of the Mississippi River environment.

Page 407, First Sentence - We would like to know how the Corps of Engineers could have dredged 314,000 cubic yards of material from the bed of the Chippewa River in May of 1965, since "additional statutory authority would be needed for dredging for other than maintenance of the navigation channel."

Page 409, Second Paragraph, Fourth Sentence - It is indicated that the Philadelphia District is doing studies on the dredging of materials to appointed disposalsites with special equipment; however, it is also indicated that the technique may not work on the Mississippi River since it is only 9 feet deep instead of 40 feet deep such as the Delaware River. Discounting this possibility seems to be premature due a lack of factual information. In our opinion, a a 9-foot channel depth would not be any great obstruction to such a procedure. Certainly, barges and equipment which operated on the Delaware River would also be viable for use on the Mississippi River.

Page 415, First Paragraph, First Sentence - It is stated that few beneficial impacts would result from an increase in the plant capacity itself. We feel that this is not true since the most significant adverse environmental effects which can be attributed to dredge spoil disposal would be alleviated by the proper placement of dredge spoil in areas which are less ecological sensitive. Although the unit cost for handling of dredge spoil material may increase with additional dredge plant capacity, this extra cost would take into account the true environmental cost of the operating and maintaining of the 9-foot channel.

Page 416, Second Paragraph, First Sentence - We wonder how a permanent pool raise would be different than the current situation where pool levels are normal for a limited time of the year, while being higher for the most of the remainder of the year?

Page 422, Last Sentence - The thinning of submergent aquatic vegetation in areas which are subjected to strong currents or winds could also generate turbidity which would be detrimental to game fish and to the remaining vegetation and water quality.

Page 431, First Paragraph, Fourth Sentence - It is stated that increased hydraulic efficiency from dredging, straightening, and overbank clearing has reduced the maximum draw down to one foot. This increased hydraulic efficiency has resulted in sediment deposition causing many sloughs or backwater areas to be virtually cut off from the main flow. In such instances, the sediment deposits serve as a dike by keeping most of the water in the main channel. Therefore, localizing the flow in the main channel through indiscriminate spoil deposition has also helped to improve the hydraulic efficiency of the main channel.

Page 434, Second Paragraph, Sixth Sentence - The general movement of fish through the locks is supported only by a weak reference to the presence of white bass and fresh water drum above St. Anthony Falls after the locks had been completed. This reference has ignored much stronger published data by the UMRCC and the Wisconsin Department of Natural Resources on the movements of channel catfish, walleye, sauger, and white bass.

Page 441, Second Paragraph, Last Sentence - The auxiliary locks are presently a popular fishing site for walleye and sauger. Use of the auxiliary locks for recreational boating would adversely affect this fishery.

Page 444, First Sentence - These data would seem to support the contention that no new bedload material is being added by tributaries below the Chippewa River since the gradation of the spoil material merely becomes finer. This would be reasonably since as the sediment from the Chippewa River is passed downstream, it would deposit finer and finer material progressively downstream.

Page 445, Item g - Existing laws in Wisconsin would provide adequate controls for the regulation of developments in the floodplain which are not in the public interest.

Page 445, Item h - Part of the economic impact on private dredge contractors could be offset by awarding contracts to them for providing maintenance dredging on the navigation channel.

Page 446, Item j - There appears to be no shortage of soft shell turtles which utilize dredge spoil sites for nesting at the present time.

Page 446, Third Paragraph, Fifth Sentence - It is indicated that the most anyone has stated they would pay for the spoil material is 25 cents per cubic yard located in a suitable stockpile area. This appears to be an unsubstantiated statement since material of this nature was being sold in the La Crosse area this past year for several times 25 cents per cubic yard. As time progresses, certainly this type of material will become more and more valuable.

Page 449, Second Paragraph, First Sentence - Considerations would have to be given to flooding, should camp and picnic facilities be provided on dredge spoil areas. Trash cans and picnic tables would have to be anchored so that they would not be carried away by floods. Sanitary facilities would have to be capable of being pumped out and contained so that contamination of surface waters did not result during flooding. In addition, some form of poison ivy control would be necessary since poison ivy grows in very dense stands on dredge spoil sites.

Page 452, Second Paragraph, Third Sentence - The development of recreational sites on dredge spoil areas would have to be done in coordination with the nonfederal interests, and such developments would have to be in agreement with their long-range recreational plans.

Page 453, Last Sentence - The possibility of establishing wildlife habitat by "judicious use of dredge material" is discussed. The proposals which have been presented are quite speculative and it is extremely unlikely that such programs could be implemented. In effect, the proposals to establish wildlife habitat with dredge material amounts to a trade off of previously existing good wetland habitat for poor terrestrial habitat of little value to wildlife. In dealing with water resources, it would seem more prudent and logical to improve the aquatic habitat of the area.

Page 456, First Paragraph, Third Sentence - The terrestrial habitat which was created would not have near the value of the aquatic habitat which was lost.

Page 457, First Paragraph - While it would appear logical to approach the best alternative concept on a pool-by-pool basis, without the proper background studies of a quantitative and definitive nature, it does not seem that rational alternatives can be selected at this time for each pool. The assignment of cost quantified adverse impacts, plus construction costs of specific alternatives must be included before a rational conclusion can be drawn on the best available alternative. Without such quantification and analysis, the Draft Environmental Impact Statement becomes one of economic analysis for expenditures and not one of any overall study to determine the least long-term cost to the public for the 9-foot channel project.

Page 461, Last Paragraph - The alternative of allowing private dredge contractors to dredge portions of the channel, particularly where there are continual maintenance problems, should have been considered.

Page 480, Item c - It is not certain whether the two remote disposal sites would require a total of 50 acres or would each require 50 acres for a total of 100 acres.

Page 487, First Paragraph, Second Sentence - There is a discrepancy between the statement that "A remnant population of a once common mollusk (Lampsilis higginsi) is alleged to exist in the Hudson, Wisconsin area." And the statement on page 151 that "This mussle is reported from the Hudson, Wisconsin, area of Lake St. Croix, which lies within the study area." There is a considerable difference between "alleged to exist" and is "reported from". Since this species of mussle is listed as threatened and is included on the list of Rare and Endangered Mollusks in the United States, an evaluation should be made on the effect of dredging in Lake St. Croix on this species. In addition, the measures which would be taken to avoid harm to this species should be presented.

Page 489, Item b, Second Sentence - It is not clear whether selective placement would require four sites with an additional total acreage of 75 acres or if each site would require 75 acres for a total of 300 acres.

Page 497, Third Sentence - It is very unlikely that "brush types" could be planted to make any significant impact on the deer herd especially since starvation is normally not a problem along the Mississippi River Valley.

Page 497, Item a, Third Sentence - It should be recognized that natural channel borders are important ecological niches or edges. These edges provide for a diversity of habitat types and for a diversity of wildlife species.

Page 498, First Sentence - It should be noted that this alternative would result in the channelization of 4 miles of the main river border.

Page 502, Second Paragraph, Third Sentence - One dredging operation is not sufficient to determine if this particular alternative is viable. The abandonment of this alternative appears to resemble an incredulous situation where the "experiment was so successful that it was abandoned".

Page 503, Item d - By looking at Exhibit 37, it is quite easy to see that more than a few openings above and below Lake Pepin may be susceptible to filling due to naturally occuring sediments and secondary movements of dredge spoil material.

Page 503, Item d, Second Sentence - The upper Lake Pepin sloughs and lakes are located at river mile 790. This is a state-owned wildlife area and is an important waterfowl use area. This area provides valuable wildlife habitat.

Page 504, Item f, Third Sentence - If dredge spoil material were used to "freshen existing beach areas", we would like to know where the old dredge spoil went to?

Page 506, First Sentence - This is a critical situation which is in need of correction.

Page 508, Second Paragraph, Last Sentence - By consulting Exhibit 37, it can be seen that the stretch of river in the Weaver Bottoms area is a prime example of what continued dredge spoil disposal along the main channel of the Mississippi River will lead to, and what that area would look like in the future. This may be one of the best examples of advanced channelization of the Mississippi River in the entire St. Paul District.

Page 510, Item d - The dredging of openings into backwater areas is considered to be a necessity in order to correct past dredge spoil disposal practices in this area.

Page 513, Second Sentence - The hydraulic effects of such barriers with respect to wave action would need to be carefully considered. The reduction of erosive forces of wind would be fine as long as the barriers would allow enough flow and would not constitute a stagnating sediment trap similar to the present spoil deposits in inlets and outlets. These barriers would have to parallel the flow of current and would have to provide for the flow of fresh water through them.

Page 532, Item b, First Sentence - Past spoil deposition on the three islands has resulted in the filling of backwater areas. Spoil deposition on the west river bank across from Winter's Landing has covered four wing dams which provide good fish habitat adjacent to the shore. This instance of filling wing dams is a good example of a violation of the UMRCC dredge spoil survey.

Page 532, Item c, Second Sentence - We would like to know where this floodplain forest is located since the Wisconsin Department of Natural Resources is studying the possibility of providing a scientific area in the Black River bottoms. This area is a good example of a lowland forest.

Page 533, Item d, Third Sentence - The inlet to Lake Onalaska just south of Dakota has very likely been affected by dredge spoil. Spring Slough, Gibbs Chute, and Proudfoot Slough are also filling with sand although they are not as close to spoil sites as the other two side channels.

Page 534, Item f, First Sentence - Recent water level fluctuations in Pool 7 seem to indicate that this may be already a practice.

Page 538, Item c, First Sentence - We would like to know where these two remote disposal sites would be located?

Page 539, Item d, First Sentence - Again, we would like to know where this central disposal site would be located?

Page 541, First Paragraph, Second Sentence - The depositing of dredge spoil material directly in or above the mouth of Morman Slough would have an adverse impact on the continued supply of fresh water to the Goose Island area which contains valuable waterfowl habitat. Deposition of dredge spoil materials near the mouth of Morman Slough would also contribute sediments to the Crosby Slough area.

Page 542, Second Sentence - The reintroduction of vegetation in the Brownsville-Crosby Slough area would be better than bare sand, but would not be as good as what was originally covered up. Past spoil disposal on Crosby Island has practically eliminated one side channel, while others have been affected, though not blocked completely.

Page 547, Second Sentence - It is very likely that this backwater disposal area would adversely affect some of the best duck hunting areas in Pool 8 and, therefore, would not be environmentally reasonable.

Page 551, First Sentence - The inlets which have been closed by dredge spoil material should be located and reopened.

Page 559, Item a, Fourth Sentence - It is stated that two open sand disposal sites are located directly upstream from a slough at river mile 627.9. Any possible secondary movement of sediments has a potential for closing the slough at Wyalusing. In reality, significant secondary movement of sediments has already occurred. A problem exists that high water would move an additional quantity of sediment downstream and close the slough to navigation. In order to prevent this from occuring and in order to maintain the existing character of the slough, it may be necessary to remove the spoil material from the area completely.

Page 560, Item b, Sixth Sentence - The McGregor Lake and McMillan Island area have been selected as possible disposal sites. Both of these disposal areas appear to be in the floodway and have been used as disposal site to some extent in the past. Selective placement of spoil material at these sites would not resolve the environmental problems associated with the secondary movement of sediments.

Page 561, Item e, Last Sentence - It appears that the supply of sand beaches actually creates the demand. If more of these dredge spoil sites were vegetated they would receive more use by wildlife and less use by recreationists.

Page 571, Paragraph One - It should be kept in mind that an alternative action should be judged on the basis of a specific example rather than on generalizations.

Page 573, Items a and b - Although the net change in aquatic to terrestrial habitat of the status quo plan (1,135 acres) is nearly equal to the selective placement plan (910 acres), the effects of secondary movement of dredge spoil material are not included; however, they could be very important.

Page 575, Item c - The cost of this alternative should not be considered solely on the basis of expediency without an evaluation of environmental and social costs which are attributed to the status quo alternative. This is the only alternative plan that substantially reduces the continued loss of aquatic habitat due to dredge spoil disposal practices which in our mind is a critical issue.

Page 578, First Paragraph, Third Sentence - Sedimentation in a natural free-flowing stream does not result in the degradation of fish and wildlife habitat since the amount and ratio of deep and shallow water and terrestrial habitat remains fairly constant though their specific location may change with erosion and sedimentation patterns. The unnatural impoundment and dredging situation created by the 9-foot channel transfers flow from the productive biological areas of the backwaters, to the main channel itself. The information which is presently lacking must be obtained in order to answer the relationship between the 9-foot channel project and the continuing decline of habitat for fish and wildlife.

Page 580 - A critical analysis of Section Six points out that the best alternative from the short-term and long-term standpoint is the removal of the dredge spoil material from the floodplain completely, unless other information is provided which proves the situation to be otherwise. This conclusion is not in agreement with the basic tone of the alternatives section which implied that the status quo alternative was the best since it cost the least, since there was some natural sedimentation which was happening independent of dredge spoil disposal, and since this alternative had the authorization of Congress.

Page 581, Paragraph Two, Fourth Sentence - We would like to know why the restoration of degraded areas is considered excessive since in the long-term, the public may lose more in terms of environmental costs than may be gained by increased transportation savings. Once the Mississippi River is traded off for a barge canal, it could never be recreated to its former condition.

Page 583, Paragraph One - There would be new colonization of benthic organisms only if sufficient time was allowed between spoiling periods, and if there was little or no secondary movement of dredge spoil material. This would also be dependent upon several environmental parameters such as depth and flow not being changed to the extent that it would preclude recovery.

Page 583, Second Paragraph, First Sentence - This is an important comment which points out that the way dredge spoil is managed can serve to encourage or discourage development in the floodplain.

Page 584, First Paragraph - It is true that sedimentation is going to occur with or without the 9-foot channel project; however, relocation of flows into the main channel would not necessarily occur without wing dams, closing structures, and the depositing of dredge spoil material along the main channel border. Therefore, the idea that sedimentation is bound to decrease the river's productivity with or without the project is not true. The project as a whole is resulting in decreased fish and wildlife habitat, and measures to aleviate this situation should be a part of the short-term project cost. The last sentence in this paragraph sums up the tradeoff rather succinctly except that it should be pointed out that the tradeoff is between a quality aquatic habitat compared to a low quality and oftentimes sparsely vegetated terrestrial habitat of very low quality for wildlife.

Page 587, First Paragraph, Last Sentence - It is our opinion that the Draft Environmental Impact Statement should have included a recommendation for future action.

Page 595, Status of Litigation - This section should be updated to include the March 6, 1974, opinion and order of Judge Doyle.

Exhibit 77 - Otters should be listed as a species inhabiting both deep marshes and shallow marshes. The white-tailed jack rabbit and Hungarian partridge inhabiting the prairie grassland would be considered as being rare in Wisconsin.

Exhibit 63 - The St. Croix River is labeled wrong on this exhibit.

Exhibit 82 - Scripus should be spelled Scirpus and Saliz should be spelled Salix.

Exhibit 84, Page 86 - Gray fox would be considered as occasional rather than common, and river otter would be considered as common rather than occasional.

Exhibit 89 - The six-lined race runner is considered to be a endangered species in the State of Wisconsin.

Exhibit 90 - The scientific and common names for fish species apparently did not follow the latest American Fishery Society nomenclature (1970).

Exhibit 90, Page 104 - Scaphithynchus should be spelled Scaphirynchus and is known as the pallid sturgeon.

Exhibit 90, Page 105 - The central common shiner is now the striped shiner (Notropis chrysocephalus).

Exhibit 90, Page 106 - The channel mimmic shiner has been dropped as a subspecies. The pugnosed minnow is now Notropis emiliae. The common sucker is the same as the white sucker.

Exhibit 99, Page 118 - Aplectrum hyemale is known as the adam-and-eve or the putty root.

Exhibit 187, Page 206 - We wonder how it is possible to arrive at the accuracy of the indicated water quality parameters to three significant figures.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 254

SUMMARY

Most of the Draft Environmental Impact Statement is filler with occasional comments of interest inserted here and there. There is a great deal of repetition and attitude change between environmental and economic viewpoints. The latter, not surprisingly, are found to be considerably at odds.

The main points of interest can be summarized from the statement as:

(1) It is admitted that aquatic habitat degradation has occurred and is occurring.

(2) That the creation and maintenance of the 9-foot navigation channel may have been responsible for some part of the problem, but nobody knows how much of it for sure.

(3) That certain measures could be taken to minimize potential damage due to maintenance of the project, and possibly some part of the past damage could be restored.

(4) That all of the above measures are quite costly compared to the status quo, even if environmental costs are not included.

(5) That the value of the various alternatives for protecting or improving aquatic habitat needs close examination.

Based on our analysis of this Draft Environmental Impact Statement, we can only conclude that it is inadequate and there is need of major redrafting. We also conclude that the alternatives are in need of documentation, particularly in terms of cost estimates, so that the adverse and beneficial effects of each can be ascertained. The analysis of alternatives should be considered in the same detail as the status quo alternatives so as not to preclude any less environmentally damaging options.

Very truly yours,
Bureau of Environmental Impact

C D Besadny

C. D. Besadny
Director

State of Wisconsin \ DEPARTMENT OF TRANSPORTATION

OFFICE OF THE SECRETARY
Room 1208 Hill Farms State Office Bldg.
4802 Sheboygan Avenue
Madison, Wisconsin 53702
Telephone 266-1113

April 4, 1974

Colonel Rodney E. Cox
District Engineer
St. Paul District Corps of Engineers
1210 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

NCSED-ER
Operation and Maintenance
of the 9-Foot Navigation Channel,
Upper Mississippi River,
Head of Navigation to Guttenberg, Iowa

We have received the above Draft Environmental Impact Statement and offer the following comments:

The remote disposals or removals of spoil from the flood plain could result in a substantial increase of truck traffic in the work area. This increased volume, with the probable spilling of the spoil, would cause safety problems along with the accelerated deterioration of highway pavements and roadbeds.

Thank you for the opportunity of commenting on this document.

Sincerely,

T. J. Hart
Deputy Secretary
Wisconsin Department of Transportation

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 255

LETTER OF COMMENT

WISCONSIN DEPARTMENT OF TRANSPORTATION
23 APRIL 1974

Metropolitan Council
of the Twin Cities Area

300 Metro Square Building, 7th Street and Robert Street, Saint Paul, Minnesota 55101 Area 612, 227-9421

April 30, 1974

Colonel Rodney L. Cox, District Engineer
Saint Paul District
U.S. Army Corps of Engineers
1210 U.S. Post Office and Custom House
Saint Paul, Minnesota 55101

Dear Colonel Cox:

The Metropolitan Council has received the draft Environmental Impact Statement on the Operation and Maintenance of the 9-foot Navigation Channel on the Upper Mississippi River along with the request for our review and comment. The EIS was reviewed under the basic assumption that there would be a 9-foot channel maintained. However, the Metropolitan Council has taken no position on the continued necessity for the 9-foot channel.

The Metropolitan Council recognizes the Mississippi River as an important regional resource, and therefore, is interested in major projects affecting that resource. The annual maintenance program of the 9-foot channel, including the disposal of dredge material is such a project.

The Metropolitan Council has adopted several policies in its Metropolitan Development Guide which are pertinent to this project. The Corps of Engineers should acknowledge these policies in the final Environmental Impact Statement.

> <u>Protection Open Space #15</u>
>
> ANY ALTERATION TO THE SHORELINE, CHANNEL OR BOTTOM PROFILE OF WATER BODIES AND WATER COURSES BY FILLING OR DREDGING MUST BE DEMONSTRATED BY THE PROPONENT TO THE UNIT OF GOVERNMENT TO BE NON-DETRIMENTAL TO THE RESOURCE AND MUST BE IN ACCORDANCE WITH MINNESOTA DEPARTMENT OF NATURAL RESOURCE REQUIREMENTS.
>
> <u>Protection Open Space #25</u>
>
> COUNTIES, MUNICIPALITIES AND OTHER UNITS OF GOVERNMENT SHOULD NOT ALLOW ENCROACHMENTS INTO THE WATER COURSES OR FLOODPLAINS WHICH WOULD REDUCE THEIR WATER CARRYING ABILITY BELOW PLANNED CAPACITY.

An Agency Created to Coordinate the Planning and Development of the Twin Cities Metropolitan Area Comprising:
Anoka County   Carver County   Dakota County   Hennepin County   Ramsey County   Scott County   Washington County

EXHIBIT 256   LETTER OF COMMENT
METROPOLITAN COUNCIL OF THE TWIN CITIES AREA

Water Resources #13

AREAS KNOWN TO HAVE BEEN INUNDATED BY FLOODWATERS OR HIGH LAKE LEVELS SHOULD NOT BE FILLED IN, DEVELOPED OR OTHERWISE ALTERED UNTIL: 1) A FLOODPLAIN STUDY HAS BEEN COMPLETED, 2) FLOODPLAIN MAPS HAVE BEEN PREPARED AND A FLOODWAY DELINEATED.

I requested the staff to review the draft EIS for those reaches of the river within the metropolitan area and to prepare a memorandum on their findings. The memorandum is attached. Essentially it says that the draft EIS does not provide the necessary information to allow the Metropolitan Council to make a judgement on the project and the alternatives proposed.

If I can provide more information to the Corps on this matter, please call me.

Sincerely,

John Boland
Chairman

Enc.
JB:lm

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 256

METROPOLITAN COUNCIL
Suite 300, Metro Square Building, Saint Paul, Minnesota 55101

FROM: Staff of the Metropolitan Council

SUBJECT: Comments on the Draft Environmental Impact Statement on the Operation and Maintenance of the 9-Foot Navigation Channel Upper Mississippi River

The Army Corps of Engineers has prepared a draft Environmental Impact Statement on the operation and maintenance of the 9-foot navigation channel, Upper Mississippi River, and has submitted the document to the Metropolitan Council for "review and comment" as part of the required coordination.

The operation and maintenance of the 9-foot navigation channel is not before the Metropolitan Council under the A-95 regional review process. However, the Metropolitan Development Guide has recognized the Mississippi River has an important natural resource in the area, therefore, the staff has reviewed the draft Environmental Impact Statement. The review was done under the assumption that there would be a continuation of the 9-foot channel. However, this assumption does not reflect an official position of the Metropolitan Council.

A comparison between the Corps' guidelines for an Environmental Impact Statement (February 1973) and the draft EIS indicates that in general the statement addresses the required major issues. However, some of these major issues are not addressed in the detail necessary for proper decision making.

The staff comments are organized according to the main components of the draft Environmental Impact Statement.

1. Project description
2. Environmental setting without the project
3. Environmental impact of the proposed action
4. Any adverse environmental effects which cannot be avoided should the project be implemented
5. Alternatives to the proposed action
6. Relationship between local short term uses of man's environment and the maintenance and enhancement of long term productivity
7. Any irreversible and irretrivable commitments of resources which would be involved in the proposed action should it be implemented
8. Coordination with others

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 256

1. Project Description

The project description section presents detailed information on the history of the 9-foot channel and on the operation and maintenance of the channel. This information is useful and important but there is a major omission in the project description. There is no definition of the objectives of the project. There is no discussion of the underlying purpose of the project, nor is a need for the project demonstrated anywhere in the document. These data are necessary to the decision making process for they provide the bases for judging the impacts and alternatives.

A minor point in this section is that the study area is not clearly delineated--neither verbally nor graphically.

2. Environmental Setting

The Statement provides a relatively detailed and apparently accurate description of the study area. The description covers the physical and biological aspects of the study area as well as the socio-economic aspects.

The pool reports refer to the Metropolitan Council's Parks and Open Space Program in the land use discussion. The accurate reference is the Protection Open Space and Recreation Open Space chapters of the Metropolitan Development Guide; when appropriate reference should be made to the other Guide chapters.

The discussions of land use should include more specifics on applicable land use plans and land use regulations.

3. Environmental Impacts

The draft Statement includes a brief discussion of the various impacts the project would have on the study area, e.g., on economics, wildlife, recreation and land use. The data presented seem to be accurate and an adequate range of impact types are discussed. However, the discussions of the impacts, in both the summary report and the pool reports, seems to be very general. There is not a clear identification of the positive and negative benefits. More importantly, there is no framework within which to judge the impacts nor are there any criteria for judging them. The general nature of the discussion makes it difficult to relate the impacts to specific areas, e.g., reaches within the Metropolitan Area.

4. Unavoidable Impacts

The discussion of unavoidable impacts in both the summary report and the pool reports seems very brief and general. There is no indication of the significance of these unavoidable impacts.

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 256

In both discussions of the merits of the project, a clear listing of the objectives of the project would be very useful in assessing the impacts. The question which is unanswered here is, "Does the need for the project override the detrimental effects of the project?" This section does not discuss "remedial, protective and mitigation measures which would be taken as part of the proposed action by the Corps or others to eliminate or compensate for any adverse aspects of the proposed action." (Corps EIS guidelines)

5. Alternatives

According to the Corps' guidelines, this section is intended to "describe the various alternatives to the proposed action, their environmental impact, their ability to accomplish the objectives, either in whole or part, of the proposed action, specifically taking into account the alternative of no action."

A major problem with this section, in fact the entire document, is that there is no statement of the objectives. It is impossible to determine if an alternative accomplishes the objectives if those objectives are unknown or only vaguely alluded to.

Assuming that the "modification" alternative is the most reasonable alternative for the project, there are a number of comments to be made on the alternatives within this alternative. An attempt was made to evaluate the "alternative plans" for the pools in the metropolitan area to select an appropriate "alternative plan." For several reasons this attempt was unsuccessful. The first difficulty was that the Statement definitely said these were not the "best or only alternatives" for alleviating the impacts of the operation and maintenance of the channel. It is difficult to select a plan from several examples of possible plans. Why not present the most feasible or reasonable plans for discussion? Another problem was that, although the alternative plans were designed to alleviate the impacts of the project, there is no indication of the impacts to be alleviated. Also, there is no discussion in detail of the impacts of each "alternative plan" including exact locations although the tables provide some information. As the alternatives are to be weighed according to the impacts it is necessary to know those impacts. The Statement discusses a number of "alternative measures" which were combined in various ways to form the "alternative plan" for each pool. What was the basis for determining the appropriate measures for each pool? Other than cost figures, there is little data presented to aid in the selection of an "alternative plan."

6. Relationship Between Short Term Use and Long Term Productivity

This section is very brief and general. It does not clearly define the relationships nor does it put them in a context which would allow objective evaluation of the relationship. What will the changes in river because of the short term use mean to future generations?

CORPS OF ENGINEERS

ST. PAUL DISTRICT
EXHIBIT 256

7. Irreversible and Irretrievable Commitments of Resources

This is essentially a summary of the impacts. The section could be expanded to include information about what the irretrievable commitment of resources means to the study area.

8. Coordination

The EIS indicates that there has been a great deal of coordination through public meetings and dissemination of reports. The final Statement should fully incorporate the results of this coordination.

Conclusion

The draft Environmental Impact Statement is too general and incomplete to make any objective decision on the operation and maintenance of the 9-foot channel. The staff of the Metropolitan Council is not in a position to make a selection of an "alternative plan" due to the insufficient detail, especially of the particular impacts by pool.

Several recommendations can be made as to improvements in the final document.

- There should be a statement of the goals and objectives of the project.
- There should be a discussion of the need for the project, or at least reference to other documents which establish the need.
- All "alternative plans" for operation and maintenance should be thoroughly assessed including a detailed discussion of associated impacts.
- There should be criteria established for evaluating the impacts of the project and alternatives.

VFH:lm
4.30.74

CITY OF SAINT PAUL

ROSE MIX
[redacted]
City Clerk and
Council Secretary

Albert B. Olson
Council Recorder

OFFICE OF THE CITY CLERK BUREAU OF RECORDS

386 City Hall St. Paul, Minnesota 55102

April 26, 1974

Colonel Rodney E. Cox
District Engineer
Corps of Engineers
St. Paul District
1210 U.S. Post Office and Customs House
St. Paul, Minnesota 55101

Dear Sir:

Attached is a Resolution of the Saint Paul City Council, Council File No. 263431, adopted April 26, 1974, making certain findings in connection with dredging activities on the Mississippi River and the importance of barge traffic and supporting a request of the Corps of Engineers for a modification of the Opinion and Order of the Court during certain emergency situations as more fully set out therein.

Yours very truly,

Rose Mix

City Clerk

ABO:mjf
Attach.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 257

LETTER OF COMMENT
SAINT PAUL CITY COUNCIL

CITY OF SAINT PAUL

Council File NO. 263431

Council Resolution

Presented By ... Leo Meredith

Referred To .... Committee: Date ....

Out of Committee By .... Date ....

WHEREAS, the State of Wisconsin has commenced a lawsuit in the United States District Court for the Western District of Wisconsin entitled State of Wisconsin v. Callaway, Corps of Engineers, Clarke, Cox and filed as Suit No. 73-C-183, wherein the State of Wisconsin seeks injunctive relief with respect to dredging activities in that part of the Mississippi River which forms a boundary of the State of Wisconsin; and

WHEREAS, the United States District Court for the Western District of Wisconsin in its Opinion and Order dated March 6, 1974, enjoined the Corps of Engineers from depositing any spoil material from the Mississippi River upon lands or within waters lying within the boundaries of the State of Wisconsin; and

WHEREAS, the City Council of the City of Saint Paul endorses the finding of the United States District Court in its Opinion and Order wherein it was found as a matter of fact that "Unless a channel of nine feet or more in depth and of adequate width is maintained, commercial navigation on the river is seriously impeded, with major consequences to business, industry, agriculture, utilities, and consumers in a large geographical area which is dependent upon the movement of raw materials and finished goods by river vessels, principally barges", and

WHEREAS, the United States District Court in its Opinion and Order provided that the Corps of Engineers may apply to the Court from time to time for modification of the injunction in emergency situations; and

COUNCILMEN

Yeas Nays

~~xxxx~~ Butler

Konopatzki .... In Favor

Levine

Meredith .... Against

~~xxxxxx~~ Roedler

Tedesco

Mme. President ~~xxxx~~ Hunt

Adopted by Council. Date ....

Certified Passed by Council Secretary

By ....

Approved by Mayor: Date ....

By ....

Requested by Department of:

....

By ....

Form Approved by City Attorney

By Pierre N. Regnier

Approved by Mayor for Submission to Council

By ....

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 257

WHEREAS, the economy of the City of Saint Paul and the surrounding region is directly dependent to a substantial degree on the exportation and importation of goods, materials and supplies by barges on the Mississippi River; and

WHEREAS, serious effects may result to the social, economic and physical environment of the City of Saint Paul if river traffic is impeded to such an extent as to require other alternative methods of transportation which may or may not be available; now, therefore, be it

RESOLVED:

1. That the City Council of the City of Saint Paul hereby determines and declares that it is in the best interests of the social, economic and physical well being of the people living within the City of Saint Paul and the surrounding region to allow barge traffic to continue unimpeded throughout the entire Mississippi River corridor.

2. That the City Council of the City of Saint Paul hereby determines and declares that any stoppage of barge traffic on the Mississippi River during the barge season creates an emergency situation affecting the social, economic and physical well being of the people of the City of Saint Paul and the surrounding region.

3. That the City Council of the City of Saint Paul hereby expresses its support for and urges a request by the Corps of Engineers for a modification of the Opinion and Order dated March 6, 1974 during emergency situations whereby river traffic may be impeded.

4. That the City Council of the City of Saint Paul hereby requests that the administrative agencies and departments of the City of Saint Paul be made available to assist in the discovery of new solutions to the deposit of spoil materials dredged from the channel so as to protect the environmental concerns of the State of Wisconsin while at the same time preventing the stoppage of barge traffic on the Mississippi River.

5. That the City Clerk of the City of Saint Paul be directed to forward a copy of this resolution to the Honorable James E. Doyle of the United States District Court for the Western District of Wisconsin and all parties to the lawsuit and other organizations as follows:

263431

3.

1. State of Wisconsin by its Governor, Patrick Lucey

2. Edward H. Callaway, Secretary
Department of the Army
United States of America
The Pentagon
Washington, D.C. 20301

3. Corps of Engineers
Department of the Army
Washington, D.C. 20314

4. Lt. Gen. Frederick J. Clarke
Chief of Engineers
Department of the Army
Washington, D.C. 20314

5. Colonel Rodney E. Cox
District Engineer
Corps of Engineers
St. Paul District
1210 U.S. Post Office and Customs House
St. Paul, Minnesota, 55101

6. Upper Mississippi Waterway Association
700 Midland Bank Building
Minneapolis, Minnesota 55401

7. Wendell R. Anderson, Governor of the State of Minnesota

8. Hubert H. Humphrey
United States Senator

9. Walter F. Mondale
United States Senator

10. Albert H. Quie
United States Congressman

11. Ancher Nelsen
United States Congressman

12. William Frenzel
United States Congressman

CITY OF SAINT PAUL

Council Resolution

Council File NO. 263131

Presented By

Referred To Committee: Date

Out of Committee By Date

4.

13. Joseph E. Karth
United States Congressman

14. Donald M. Fraser
United States Congressman

15. Robert Bergland
United States Congressman

16. John Zwach
United States Congressman

17. John A. Blatnik
United States Congressman

18. Port Authority of the City of Saint Paul

COUNCILMEN

Yeas Nays

~~xxxxx~~ Butler

Konopatzki

~~Levine~~

Meredith

~~xxxxxxxx~~ Roedler

Tedesco

Mme. President ~~xxxx~~ Hunt

5 In Favor

0 Against

Adopted by Council: Date APR 2 6 1974

Certified Passed by Council Secretary

By

Approved by Mayor: Date APR 29 1974

By

Requested by Department of:

By

Form Approved by City Attorney

By

Approved by Mayor for Submission to Council

By

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 257

PORT AUTHORITY OF THE CITY OF SAINT PAUL
330 MINNESOTA BUILDING, 4TH AND CEDAR, SAINT PAUL, MINN. 55101. PHONE (612) 224-5686

April 8, 1974

CERTIFIED MAIL

Rodney E. Cox, Colonel
St. Paul District Corps of Engineers
1210 U. S. Post Office and Customs House
St. Paul, Minnesota 55101

RE: Reply to NCSED-ER

Dear Colonel Cox:

My staff and I have reviewed the Draft Environmental Impact Statement concerning the operation and maintenance of the 9-foot navigational channel, Upper Mississippi River, Head of Navigation 2, Guttenberg, Iowa, prepared February 1974. I wish to comment on its affect to the Port Authority of the City of St. Paul and the Upper Mississippi River users.

The St. Paul Port Authority has been actively working towards increasing the commercial use of the river in the St. Paul District. We have worked with numerous firms in assisting them to locate facilities and terminals that are directly dependent on river activities. Some of the products currently handled by Port Authority tenants include steel, coal, salt, fertilizers, sand, petroleum products, lumber, grain, cement, molasses and other products that can benefit from the low cost afforded by river transportation. The current situation with the State of Wisconsin and their action towards curtailing spoils deposits presents a very serious problem for any industry currently depending on the river for shipments or receipts of products. Two of the major items that are handled in the St. Paul District include downriver shipment of grain from farmers in Minnesota, the Dakotas and surrounding states. Any interruption in the outbound movement of this grain by water transportation could have a serious economic effect on the agricultural areas of these states.

ROBERT F. SPRAFKA, EXECUTIVE VICE PRESIDENT
EUGENE A. KRAUT, C.I.D., ASSISTANT EXECUTIVE VICE PRESIDENT
DONALD G. DUNSHEE, C.I.D., DIRECTOR, INDUSTRIAL DEVELOPMENT
CLIFFORD E. RAMSTED, CHIEF ENGINEER
ROSCOE C. BROWN, CHIEF ACCOUNTANT

COMMISSIONERS: JOHN L. SEGL, PRESIDENT; DEAN MEREDITH, VICE PRESIDENT; LOUIS H. MEYERS, SECRETARY; RICHARD E. ARETS, TREASURER; JOHN F. NASH; VICTOR J. TEDESCO; GEORGE W. WINTER

LEGISLATIVE ADVISOR: RAY W. FARICY, STATE REPRESENTATIVE

C.I.D. Certified Industrial Developer

CORPS OF ENGINEERS
ST. PAUL DISTRICT

LETTER OF COMMENT
PORT AUTHORITY OF SAINT PAUL

EXHIBIT 258

The electric utilities and other industries in the upper midwest are becoming very dependent on the use of the river for transporting coal. This coal is essential in the generation of electricity for power companies as well as energy generation for industries in the area.

I realize in reading the report that there are problems in handling the disposal of the spoils but feel that satisfactory solutions can be worked out with the various state and Federal agencies and the Corps of Engineers to prevent any interruption in the use of the river for water transportation.

We have reviewed with great interest, the section starting on Page 481 of the Draft Environmental Impact Statement concerning the disposal of spoils in Pool No. 2. Since this is the pool that the Port Authority of the City of St. Paul operates in, we are extremely interested in working with the Corps of Engineers in finding additional sites for the disposal of spoils material. In the past, we have permitted the Corps of Engineers to deposit spoils on our property as well as provide easements across our property to be used in the deposition of spoils material. We feel that the spoils material is a valuable construction material and could be used by others in need of sandy material in their manufacturing process to utilize this material.

Again, we are hopeful that the problem concerning the disposal of spoils will not prevent any interruption in the shipping season either this year or any year in the future. Since so many people are dependent on the river for industrial and commercial use as well as recreational use, we look forward to no interruption and the continued cooperation we have had from the Corps of Engineers.

Very truly yours,

Robert F. Sprafka
Executive Vice President

RFS:DGD:mks

RESOLUTION No. 5

Regarding Mississippi River Dredging

WHEREAS, the movement of barges on the Mississippi River is extremely important to the movement of coal, fuel oil, corn, soy beans, salt, fertilizer and other economic products and other economy of Crawford County, and

WHEREAS, dredging of the Mississippi is necessary at critical points for continued barge transportation

THEREFORE, BE IT RESOLVED that the Crawford County Board of Supervisors support and approve the Corps of Engineers emergency plan to dredge in critical areas to assist traffic.

Glen Brender

C. M. Sevinier   Robert G. Hillman

Harry Zabel

Supervisors, Crawford County

CERTIFICATE

STATE OF WISCONSIN)
(ss
COUNTY OF CRAWFORD)

I, Milo J. Cooper, County Clerk of and for the County of Crawford of the State of Wisconsin, do hereby certify that I have compared the attached copy of a resolution with the original of said resolution on file in my office and that said copy is a true and correct copy of such original resolution duly adopted by the Crawford County Board of Supervisors at a meeting held Tuesday, April 16, 1974.

WITNESS MY HAND AND SEAL this 22nd day of April, 1974.

Milo J. Cooper

Milo J. Cooper
Crawford County Clerk
Prairie du Chien, Wisconsin 53821

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 259

LETTER OF COMMENT
CRAWFORD COUNTY BOARD, STATE OF WISCONSIN

THE IZAAK WALTON LEAGUE OF AMERICA
INCORPORATED

2602 18th St. B
Moline, Illinois 61265
April 4, 1974

Col. Rodney E. Cox, District Engineer
St. Paul District
U.S. Army Corps of Engineers
1210 U.S. Post Office and Customs House
St. Paul, Minnesota 55101

Dear Col. Cox:

The following comments are addressed to the Draft Environmental Impact Statement *for Operation and Maintenance*, 9-foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa, on behalf of the Midwest Region of the Izaak Walton League of America.

SCOPE OF STUDY

The scope of the statement is too limited in two ways.

1. A true assessment of the effects of the 9-foot channel on the Upper Mississippi River is incomplete unless the statement covers not just operation and maintenance since the project was constructed but also the effects of construction, particularly of impoundment.

2. The 9-foot channel project stretches from head of navigation to the mouth of the Missouri. The Environmental Impact Statement should cover the entire length of the project and should not be segmented into separate studies.

HAVE THE REQUIREMENTS OF NEPA BEEN MET?

This statement is not detailed enough to give an accurate picture of the environmental impact of operation and maintenance of the 9-foot channel on either aquatic or terrestrial organisms. There should be a pool by pool description of project impact covering the period of time from the beginning of the project before impoundment up to the present time.

The statement should include an analysis of habitat and habitat changes plus the effects of these changes on terrestrial and aquatic organisms at given periods since the project was started. In the case of aquatic habitat there should be a statistical analysis showing any relationship

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 260 LETTER OF COMMENT
THE IZAAK WALTON LEAGUE OF AMERICA
MIDWEST REGION

among river flow, river temperature, and water chemistry data. Aquatic studies also should include a study of light effects in relation to turbidity and other factors on river organisms. For both terrestrial and aquatic organisms there should be a thorough inventory of species, including micro-organisms. Statistical analyses should show temporal and spacial distribution of all species plus ecological relationships of populations. *The results of those studies should be statistically* correlated with relevant physical and chemical data.

Without these kinds of studies and correlations, it is an open question whether the requirement of NEPA for the environmental assessment of this project has been met.

NEED FOR ONGOING STUDIES AND UPDATED EIS'

Since the 9-foot project clearly is not completed in the sense that dredging is constantly required, studies including those of the nature suggested in the above section should be continued on an *ongoing* basis, and the Environmental Impact Statement on the 9-foot project should be updated every two years at a minimum.

ALTERNATIVES FOR PRACTICES REGARDING DREDGE SPOIL *HIGHLY BIASED IN FAVOR OF STATUS QUO SYSTEM*

The sections considering alternatives to status quo dredge spoil placement practices -- both in the general discussions and in discussions for each individual pool -- are highly biased in favor of the status quo. In the final Environmental Impact Statement these sections should be rewritten to reflect a truer picture of both costs and benefits for all the alternatives including the status quo. At the very minimum the following should be done:

1. The status quo alternatives should include not only the economic costs of actual operation but also other costs including those so-called "intangible" environmental costs. Furthermore, the operation costs for maintaining the status quo should reflect the fact that the most efficient and least expensive dredge spoil disposal areas have been used and that future sites will likely involve a higher cost. If these two suggestions were incorporated into the statement, the relative cost of the status quo alternative would show an increase.

2. The alternatives to status quo dredge spoil placement should discuss more than the economic costs. These discussions should also include the benefits that would occur including recreational benefits, wildlife benefits, and so-called "intangible" environmental benefits.

A complete benefits to cost ratio, including environmental considerations, should be developed for each alternative to make comparisons more clear and more meaningful.

NEED FOR A COMPLETE TRANSPORTATION STUDY

Almost all of the discussions regarding the economics of river-use for transportation are based on the assumption that barge transportation costs less than other transportation forms. This assumption that barge transportation is "cheaper" has been hotly disputed by many and is relative to rates versus complete costs. Therefore, all the statements based on that assumption might very well be misleading or even erroneous. There is a clear need for a detailed inter-agency study of transportation of all types in the Upper Mississippi River Basin. Such a study should be undertaken immediately and the results should be part of all future environmental impact statements for navigation related projects.

HOW WILL THE CORPS USE THE ENVIRONMENTAL IMPACT STATEMENT?

The ultimate question regarding this environmental impact statement is: How is it to be used by the Corps? One of the clear mandates of NEPA is that an environmental impact statement is to accompany a proposed project through all levels of an agency's decisionmaking process regarding a proposed project. This particular EIS is in a special category because the project is ongoing. The Corps of ENgineers, beginning now, should treat the 9-foot navigation project as though it were a new proposed project. The Corps should develop a system by which the various alternatives for continuing the 9-foot project, particularly those regarding dredge spoil disposal, are re-evaluated at all levels with provisions for participation of both other agencies and the public at every decisionmaking point in the process.

Sincerely,

Jody Smith

Jody Smith, Governor
Midwest Region
Izaak Walton League of America, Inc.

THE IZAAK WALTON LEAGUE OF AMERICA

May 7, 1974

District Engineer
U.S. Army Engineer District, St. Paul
1210 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

The following comments concern the Corps of Engineers' Draft Environmental Impact Statement on the O & M of the 9-foot channel on the Upper Mississippi River from the head of navigation to Guttenburg, Iowa.

I. GENERAL

The purpose of an EIS is to present the federal agency with a comprehensive analysis of environmental factors relative to their project so that the agency can mold decisions, mindful of their environmental impacts.

This EIS, unfortunately, fails in its mission on two counts. First, the premise and entire thrust of the statement is basically incorrect -- this is an environmental impact statement, not an economic impact statement. In this statement the environment is secondary while the reader is continually exposed to the Corps' rampant self-justifications supported by questionable economic analyses. A rosy economic picture is painted wherever there is the slightest nexus, and obscures the environmental considerations. We appreciate that the area's economy is heavily dependent on the channel, but everyone is dependent upon environmental quality.

Secondly, the environmental impact discussions are uniformly incomplete and evasive. The tendency is to attribute adverse impacts to anyone or anything but the Corps. Thus, we see turbidity being blamed on the catfish, and the considerable archeological site destruction blamed on farmers or labeled as "uncertain as to cause". Important tests which should have been included were not, so consequently no meaningful conclusions can be reached.

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CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 261

LETTER OF COMMENT
THE IZAAK WALTON LEAGUE OF AMERICA
7 MAY 1974

II. ECONOMICS

The Corps is preoccupied with the economic benefits of their project, but in advancing their justifications they commit some basic errors.

The Corps' contention that barge traffic is superior to alternative forms of transportation is dubious at best. The alleged savings materialize from a comparison of barge rates with rates prevailing on alternative forms of transportation on a ton-mile basis. The Corps conveniently overlooks the fact that in order to deliver goods between any two points, barges must travel a greater number of miles. Also, nowhere are the very real costs of the operation maintenance of the channel included. The admitted considerable savings unfortunately accrue to only the water-way shippers and their customers -- not to the general public. To be rightfully listed as a benefit, the advantages should flow to the public as a whole.

The Corps likes to list their employment costs as benefits. The Water Resources Council, however, has stated that these costs may be deemed benefits only if the area of employment has been designated as having unemployed or under-employed labor resources. There was no evidence that this area has been so designated, and until such time, payrolls must be listed as costs.

III. ENVIRONMENTAL IMPACTS

The Corps grudgingly admits to extensive adverse environmental damage as a consequence of their present operations. Unfortunately, not enough hard facts are generated by this study to aid the Corps and the public in reaching a sound planning alternative.

Dredging and dredge spoil placement with its turbidity and siltation being unavoidable, are the most mischievous aspects of the operation of the channel. If the dredging could be diminished we would take a giant step toward environmental recovery of the river. But discussion and exhibits of dredge spoil placement are misleading. Exhibits 32 through 42, which purport to show present dredge cuts and spoil banks, were derived by reference to records after 1956, and are grossly incomplete. Exhibit 76 clearly shows that in the years prior to 1956 at least twice the volume of material was removed from the river as in the years subsequent to 1956.

Studies have shown that up to 70% of all spoil deposited near the river does not remain where placed. This spoil movement results in the filling of back waters and necessitates redredging. The Corps claims however, that studies of spoil movement are incomplete, thereby discounting any solutions to the problem. Even if the 70% figure should prove upon closer examination to be too high, it is reasonable to assume that at least some spoil returns to the river. It would have been helpful to have had some hard evidence on this point. If studies should demonstrate that an overwhelming amount does return to the river, alternative plans would have to be viewed in a more favorable light.

There is no detailed discussion in the statement of the variety and numbers of fish, waterfowl, terrestial and aquatic vegetation, the effects on biological productivity, the effects of intrusion of different fish and plant species, or the effect of the operation on the food chain in the river.

We are treated to an extensive inventory of the different types of fish and vegetative and waterfowl species, but all of this is meaningless without a discussion of the trends exhibited by each. A discussion of the life found in the river prior to impoundment would also have been useful in making evaluations.

We were surprised by the discussion of the depth of the supposed 9-foot channel and the vessels that use the waterway. The towboats, it seems, are not designed for a 9-foot channel at all, but rather for an 11- or 12-foot passageway. If Congress authorized only a 9-foot channel, why are the river users treated to a much deeper draft? One obvious answer to the problems of windrowing and snowballing effects is shallower draft vessels, and not a deeper channel. Maintenance of an unnecessarily deep channel means more dredging which leads to the already noted deleterious effects. The deeper channel may very well be beyond the Corps' authority, and if so, the extra dredging should be halted.

IV. ALTERNATIVE PLANS

Cost projections for the alternative plans are misleading because they tend to assign an inflated cost to all plans other than the status quo. the plan we most favor is removal of the dredge spoil from the floodplain. However, the Corps does not treat this, or any of the other alternatives, favorably.

For example, in considering removal of the dredge spoil from the floodplain in Pool 1, the Corps assigns an astronomical annual figure to the project. However, close examination reveals that the plan includes a stockpile area (in violation of zoning) which could be eliminated; funds for secondary removal, which could be eliminated; funds for additional discharge pipes, which could be eliminated; unspecified "additional equipment", and revegetation and recreation. Revegetation and recreation are not included as costs in other alternatives, although they are more applicable, even necessary, under these other schemes.

Why should there be a stockpile area for dredged material to lie while awaiting movement off the floodplain? Why not simply load it on barges and move the material once? Double handling means increase costs, increased turbidity, increased sedimentation and needless damage to the temporary site. The costs include removal of the spoil for a distance of "about 25 miles" -- this is not a good average, since closer off-loading facilities can be found at any point on the river. We hope the costs did not include construction of completely new off-loading terminals. We would like to see a breakdown of the costs of the "additional equipment". Do the projected costs reflect the fact that quantities of dredge spoil will diminish yearly if removed from the floodplain? Were the projected costs reduced by subtracting the potential income from sale of the spoil?

Revegetation and recreation should have been listed as a completely separate plan -- not added to the other alternatives. This analysis makes the status quo appear much more economical than it really is -- and all this before the substantial, yet intangible, environmental costs are added to the status quo -- costs which could be reduced by implementation of alternative plans.

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 261

V. RECOMMENDATIONS

Since this impact statement is so appallingly deficient and incorrect in so many areas, and since we feel that more information is required to reach sound decisions we tender the following recommendations.

We recommend a complete study of the spoil movement problem. If the study demonstrates that a great amount must be re-dredged each year, then an alternative plan and greater costs now might be justified by less dredging and reduced costs in the future. The study, which might also demonstrate unacceptable backwater damage, should cover the prevailing conditions in each pool and the expectations of spoil return for varying river conditions. It should also attempt to predict the bank erosion which would result if any schemes undertaken should result in reduced sedimentation load on the river.

We recommend the institution of a monitoring system which would provide information on yearly trends in the food chain and the varieties and extent of plant and animal life in each pool. The Corps could then adjust their operations when it appeared that they led to impairment of the living conditions of important species.

We recommend a detailed inventory of the backwater areas and their conditions in the St. Paul District. After inventory the areas should be continually monitored to provide instant information. Action should be taken to guard these areas from degradation -- even if it involves the dredging of entrances to these areas. The backwater areas are the most important life-sustaining portions of the river -- if we allow the backwater areas to die, the river itself could be next.

In order to alleviate and correct the present inequities involved in the operation and maintenance of the "9-foot" channel, we recommend that a plan be initiated which would bill the users of the waterway according to some equitable scheme. The money collected should thereafter be used to mitigate environmental damage. Environmental costs would thus be passed on to the beneficiaries of the waterway -- where they rightly belong.

In the Exhibits section we recommend inclusion of the latest litigation involving the operation and maintenance of the channel. On March 6, 1974, Judge Doyle of the U.S. District Court for the Western District of Wisconsin ordered the Corps to cease all dredging which would result in the deposit of spoil on Wisconsin lands, when he became convinced of the considerable environmental damage wrought by the Corps. Inclusion of this opinion will place the litigation aspects of the Corps' operation in proper perspective, since it would be misleading to include only the 1973 decision.

If it is true, as claimed, that some reaches could still be viable water routes even if the dredging were reduced in depth and frequency, then the Corps should undertake a study to immediately identify these areas and act to reduce the operations -- thereby saving money and enhancing water quality.

We recommend that the Corps insist on shallower draft towboats for the channel. Towboats now plying the river which are incompatible with a 9-foot channel should be banished to waterways with deeper channels. The 8½ foot draft vessels now used on the Upper Mississippi were not designed for nine feet and should not be employed in this channel. The Corps is prepared to change the channel to accomodate new technology, not vice-versa. Let the ship designers develop a more powerful boat with a shallower draft and not depend on the Corps to change the channel whenever a new boat is designed.

In conclusion, we feel that this DEIS is grossly inadequate. It rarely touches the biological/ecological/environmental factors, and then only grudgingly. The statement is ponderous, repetitive, and at times totally irrelevant to the task for which it was designed. After so much of the taxpayers money was expended, the Corps could certainly have done better. After further studies and correction of the errors and deficiencies, we would be happy to have an opportunity for further comment.

26 East Exchange
St. Paul, Minnesota 55101
May 3, 1974

District Engineer
St. Paul District Corps of Engineers
U. S. Post Office and Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

As Mississippi River Task Force chairman for the Minnesota Environmental Control Citizens Association (MECCA), I offer the following comments on the Draft Environmental Impact Statement on the Operation and Maintenance of the Nine-Foot Navigation Channel.

Several of my comments can be, as you see, taken care of by simply including a glossary. However, the most serious omissions are the references to original material. These will be more difficult to add, but even more important than the definitions.

Page No.	Paragraph	
8	2	Explain how lack of need was determined
10	2	Define: weep holes
11	2	Misspelling: tainer
14	2	In view of the effect of propeller wash in shallowing the channel, the expense entailed in maintaining the channel is understandable
17	1	Define: spuds
18	1	Explain: deferred salaries
18	2	Define: gantry
20	2	3 million cubic yards of solids, or solid plus water?
21	1	"Production" does not seem to be appropriate here
21	1	Why aren't the 1973 figures here?
27	3	Misspelling: water furface
42	3	"modification" would be a less biased term than "improvement"
43	2	and would be understandable to ordinary readers
46	heading	The real name of the refuge is the "Wild Life and Fish Refuge"
48	1	"improvement" should probably read "maintenance"
49	2	Lake Itasca is the correct spelling
65	2	Misspelling: Starring Lake should be Staring Lake
67	2	Define: regosols
74	2	Segment beginning with "Sand and gravel..." and ending with "costly to maintain." appears to be irrelevant here.
77	3	Reference needed--just one of many places

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 262 LETTER OF COMMENT
MINNESOTA ENVIRONMENTAL CONTROL CITIZENS ASSOCIATION

Page No.	Paragraph	
86-89		This should definitely be resolved by further study
93	2	Is this twice the work load? What effect does this have on the amount of dredging?
95-106		The information in this section is confusing; would benefit by being arranged by pool as in the following section
105	1	Explain Shrub-Carr community
123	3	Since the park is at the backwater area downstream of Hennepin Island, rplace "In addition" with "There..."
125	1	Herons and egrets are viewed other seasons, too
128	3	After "...eagle" add "--an endangered species--"
131	3	The 2nd and 3rd sentences would be more appropriately placed at the beginning of the following paragraph
143	1	Mention where this is--other than the river mile--to get at why a study was made here
158	5	"proceeded" should probably be "preceded"
173	1	Correct name of refuge
194	2	The launching ramp at the river flats should be added
278 to 279	4 1	The part up to "...pools on river barges." was in the consultants' reports, but I was unable to find the portion following that, after much looking. If the portion beginning with "Future expansion of the barging traffic..." was <u>not</u> in those reports, the <u>first</u> sentence in the <u>following</u> paragraph should <u>precede</u> it.

I regret that the press of other business has made it impossible for me to complete my review of the Statement. However, I would like to re-emphasize the need for more statements and information to be referenced, so that readers may go back to the original source if necessary.

Sincerely yours,

Ruth McLeod

Ruth McLeod, Chairman
Mississippi River Task Force
MECCA

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 262

by Ansel Adams in *This Is the American Earth*

SIERRA CLUB

OFFICE OF THE MIDWEST REPRESENTATIVE

444 West Main, Room 10
Madison, Wisconsin 53703
(608) 257-4994

Comments of the Sierra Club

on

Draft Environmental Impact Statement

on

Operation and Maintenance of the

9-foot Navigation Channel on the

Upper Mississippi River,

Submitted to:

St. Paul District, Corps of Engineers

April 5, 1974

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 263 LETTER OF COMMENT
SIERRA CLUB

The Sierra Club is pleased to have the opportunity to comment on the draft environmental impact statement on operation and maintenance of the 9-foot navigation channel on the Upper Mississippi, from the head of navigation to Lock and Dam number 10 at Guttenberg, Iowa.

We have been anticipating the release of this statement for some time, in the hope that the careful research undertaken by the Corps' contractors and subcontractors would result in a synthesis that could have real value in gaining a perspective on the problems associated with dredging and the deposition of dredge spoil, and that ultimately the EIS would point toward solutions to those problems. We are disappointed. Although there is a good deal of valuable information about the River, this impact statement is only the latest in a dismal series of similar documents, all apparently disigned solely with the aim of protecting the public respectability of existing activities, while discouraging initiatives on alternative solutions that would deflect the Corps away from its perception of its mandate. In large part the impact statement is a rhapsody on the joys of barge navigation, and it does not intelligibly present alternatives that upset least-cost navigation on the River.

We will not attempt to present here a line by line analysis of the impact statement, although we would be happy to work with the Corps in the event more detailed comments are required. Before expending that effort, however, we would need some assurance that the impact statement will be completely redone in its tone and objectives, for we would be

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 263

loathe to commit our limited resources simply to produce a refinement of the current highly unsatisfactory approach.

We must protest one theme that runs throughout the impact statement. The point is made a number of times (for example on page 406) that the system of locks and dams on the Upper Mississippi was authorized entirely to provide a nine-foot navigation channel, and that that authorization does not extend to other benefits. This position is, of course, technically correct, but it does not follow that the Congress intended simply to turn over the River Valley, with all of its human and other inhabitants, to the Corps of Engineers for manipulation at will in the single-minded drive to achieve a nine-foot navigation channel. The nine-foot project was clearly intended to be integrated into the existing life of the River, and was not expected to subdue all reasonable and humane restraints that normally govern the affairs of man.

For the Corps to imply, as is frequently done in this impact statement, that it has no authority to achieve such an integration, and that any consequences of its activities must be accepted as the inevitable side effects of its own higher purposes, is simple nonsense. The nine-foot project is one publically authorized and subsidized operation within the Valley, but there are others. The Upper Mississippi River National Wildlife and Fish Refuge, for example, has a comparable Congressional mandate, and indeed its authorization preceeded that of the nine-foot project. Furthermore, the Valley represents a complex web of human activity, with values that are distinct from navigation. Any accomodations and compromises that must be made to fit all these patterns within a narrow corridor must require yielding on all sides: the Corps' allegation that its purposes are superior to those of all of its competitors has no legal substantiation, and is simply an arrogant assertion.

This attitude, however, firmly molds the impact statement. With great consistency, the Corps' current practices on behalf of navigation are defended as proper, the adverse consequences of those practices are minimized, and alternatives that involve a substantial commitment of resources are belittled.

The most serious weakness of the impact statement is surely its complete inability to accomplish its purpose, namely, to help inform a policy maker about the consequences of alternative actions in such a fashion as to enable that policy maker to make wise and balanced decisions about the future of the resource. For example, one of the most critical effects of dredge spoil disposal is the blocking of water flow into backwater areas. The Statement's treatment of this most important problem is restricted to one anecdote on pages 318-319, immediately countered by another anecdote demonstrating that this process occurs naturally as well. The effect of this discussion is to leave the reader doubting that dredge spoil contributes significantly to the problem at all. There is no analysis of the problem, no estimate about the nature of proportional contribution of dredge spoil, no biological assessment. In short, there is no way that an unbiased policy maker could rely on the impact statement for guidance on future courses of action.

This weakness pervades the impact statement. Environmental assessment is generally trivial, and data on costs of various alternatives is largely nonexistent.

In short, the Sierra Club recommends that this Environmental Impact Statement be completely redone. Much of the necessary data is available for the preparation of an adequate statement, and we would hope that a new draft could be available for public scrutiny in the reasonably near future.

The new statement should operate on the assumption that navigation is not the sole mandate for federal activity on the River, it should honestly address the variety of problems caused by operation and maintenance, and it should present clear and detailed alternatives, with systematic analysis of the effects and costs of each.

Action, of course, must proceed in the mean time. The Sierra Club believes that the Corps of Engineers cannot simply be permitted to continue with its present actions until this entire matter is resolved. We request that indiscriminate dumping of dredge spoil by the side of the channel be terminated to the extent possible, and that temporary emergency measures be taken to implement alternatives. These alternatives will vary from instance to instance, but will include transport of the material off of the flood plain wherever possible, and well designed and contained disposal facilities where such facilities are practical and can be constructed with minimal environmental costs.

We reject the bizarre notion presented on page 357 of the impact statement that the Corps only has the authority to dump spoil by the side of the channel, and we urgently request that remedial work proceed at once.

SEMAPO — SOUTH EAST MINNESOTA AREA-WIDE PLANNING ORGANIZATION
Box 247 · Wabasha, Minnesota 55981 1-612-565-4526

NORMAN E. INDALL, Chairman
DEMETRIUS JELATIS, Vice-Chairman
JOHN P. GRIFFIN, Executive Director
CHARLES E. DILLERUD, Secretary-Treasurer

March 15, 1974

Col. Rodney E. Cox
St. Paul District Corps of Engineers
1210 U. S. Post Office and Custom House
St. Paul, Minnesota 55101

Re: NCSED-ER

Dear Col. Cox:

We have reviewed the Draft Environmental Impact Statement for operation and maintenance, 9-foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa. The report is generally complete, with exceptions noted in the enclosure.

Thank you for the opportunity to comment on the project and we hope these comments will be of assistance to you in the preparation of the final environmental impact statement.

Sincerely,

John P. Griffin

John P. Griffin
Executive Director

JPG:vw

Enc. 1 as stated

cc: Bureau of Sport Fisheries and Wildlife
Attn: Wayne E. Gueswal

LETTER OF COMMENT EXHIBIT 264
SOUTH EAST MINNESOTA AREA-WIDE PLANNING ORGANIZATION

Southeastern Minnesota Areawide Planning Organization

Comments on Draft Environmental Impact Statement, Operation and Maintenance, 9-foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa.

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1. Page xi, 3.2: "The aesthetics of the present river setting and the production of fish and wildlife are dependent upon the continued operation and maintenance of the project."

We question the statement in that there is no doubt that present aesthetics and fauna production are affected by the project. They are, by no means, dependent upon the continued operation and maintenance. River Valley aesthetics are a combination of natural and man-made factors. In addition aesthetics is a qualitative judgement. For some, the project may be an attraction; to others it may well detract from the maximum aesthetic value. While there is reason to believe that the project has aided in fish and wildlife production, and increased habitat area, this production, per se, is not dependent upon continued operation and maintenance of the 9-foot channel.

2. Page 47, Paragraph 3: "The Upper Mississippi River Wildlife and Fish Refuge" became a reality to a large degree as a result of the 9-foot Channel Project".

This statement could easily be misinterpreted to convey the thought that the 9-foot channel project was a major factor in creating the refuge. The fact is that the Refuge was established by Federal Legislation on June 7, 1924. This legislation authorized acquisition of land by the Department of Interior for the refuge. It was only after the initiation of the 9-foot channel project (July 3, 1930) that land was acquired for the project. Following this, lands held by the Corps of Engineers were added to the refuge by cooperative agreement.

3. Page 112, Paragraph 3: "Lack of marsh and aquatic plants is no longer a problem".

This statement, from a report dated 1960, by William Green of the USFWS, is accurate in context of the report as written in 1960. However it contradicts other data in the environmental impact statement which outline damage being done to backwater areas, particularly the Weaver bottoms (see pages 315-321). The statement of Dr. Green's should be footnoted in the final statement to reflect this fact.

4. Page 152, Paragraph 3: "Two valuable feeding areas have apparently developed as a result of the construction of the 9-foot navigation project".

There is no data in the environmental impact statement to support this comment. Given the rate of flow of the Chippewa River combined with the subsequent outflow of Lake Pepin at the same location, there is reason to believe that an "open water" condition could exist anyway in early winter, providing a natural feeding area. In terms of feeding on wounded waterfowl, at Weaver, this condition could well exist in spite of the project, but there is no doubt that the project has created a larger hunting area and thus created a more viable feeding area.

5. Page 298, Paragraph 1: "Studies in this regard; however, are inconclusive at the present time, and the degree to which eroded spoil material is involved in the blockage of sloughs is not known".

From data given in the environmental impact statement, as well as concern expressed by other agencies and individuals in regard to spoil effects on backwater recreation and wildlife habitat, it would seem appropriate that further information be gathered and evaluated to determine the impact of spoil placement on backwater sloughs. It would be difficult to cite the environmental impact statement as being complete until further data and evaluation is recorded on this phenomena. While affect of dredge spoil placement on main channel waters has been adequately documented, the environmental impact statement does not sufficiently detail the impact on backwater flowage and subsequent aquatic vegetation and submerged faunal activity. Man-made versus natural sediment deposition is not deliniated sufficiently, and the intent of the environmental impact statement should not be considered as fulfilled until such determinations can be made.

6. Page 304, IMPACTS ON LAND USE:

This section implies that ownership by the federal government and the 9-foot channel project are coterminious; being one and the same. The environmental impact statement attempts to cite a "cause and effect" relationship in that the 9-foot channel provides the basis for 1) effective flood plain zoning; 2) dependable public access and recreation facility provision; and 3) "more efficient management of fish and wildlife resources."

In reality, effective floodplain zoning is a mandatory county activity in Minnesota, and is mandatory for increased flood insurance benefits on a nationwide scale. Where it is not such, there is validity in the statement, but it should be noted that where federal ownership does affect land use and zoning, it is through the presence of the Bureau of Sport Fisheries and Wildlife as well as the Corps of Engineers. In fact items b and c under IMPACTS ON LAND USE are more attributable to USFWS designation than to the Corps of Engineers. Thus federal ownership should be noted as that of more than one agency, and the "cause and effect" relationship of the nine foot channel providing cited benefits should be clarified.

7. Page 331, Paragraph 3: "Since the maintenance of a navigation channel requires dredging and the disposal of spoil, it is impossible to avoid some form of habitat conversion without sacrificing the authorized purpose of the project."

A delineation should be made between the act of channel dredging and subsequently the act of spoil disposal. There appears to be little doubt that continued maintenance requires channel dredging; and such dredging will obviously affect the site of the dredge cut. The act of dredging will affect downstream turbidity etc. as outlined in the statement. However habitat conversion due to spoil disposal is not necessarily impossible to avoid. Relocation of spoil from the floodplain may have no adverse effect on aquatic habitat. This factor should be more clearly explained in the final environmental impact statement and the above-quoted statement revised.

8. Page 332, Paragraph 1: "The degree to which any one kind of sedementary phenomenon is responsible for the isolation of backwaters remains unknown at the present time."

Same problem as outlined in our Comment #5 applies.

9. Pages 457-576 ALTERNATIVE PLANS

The environmental impact statement, in addressing the alternatives in operation and maintenance, appears to do so only lightly and does so on an arbitrary basis. In selecting those plans and measures applicable to each pool, the statement has chosen those which are "estimated" to have the most impact. More detailed coverage of the effect of all possible alternatives should be given in the final statement.

10. Page 580: "In spite of an analysis of all available pertinent information, the degree to which eroded dredge spoil is responsible for slough blockage is not known at the time of this report."

Same problem as outlined in our Comment #5 applies.

By Daniel W. McGuiness
Assistant Director

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 264

WISCONSIN SOCIETY OF PROFESSIONAL ENGINEERS
1618 W. Beltline Highway, Madison, Wis. 53713 (608) 251-7872

April 4, 1974

St. Paul District Corps of Engineers
1210 U.S. Post Office & Custom House
St. Paul, Minnesota

RE: EIS, O & M 9 ft. Channel
St. Paul District

Gentlemen:

Enclosed is a copy of an affidavit from the Wisconsin Society of Professional Engineers prepared for use in the litigation between the Wisconsin Department of Natural Resources and the U.S. Army Corps of Engineers.

Please incorporate this in the final Environmental Impact Statement.

Sincerely,

Roger E. Krempel

Roger E. Krempel, PE
President

cq
enc

1973-74
STATE OFFICERS

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Janesville

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Glenn E. Burg

Serving The Profession In The Public Interest

CORPS OF ENGINEERS
ST. PAUL DISTRICT

LETTER OF COMMENT
WISCONSIN SOCIETY OF PROFESSIONAL ENGINEERS

EXHIBIT 265

WISCONSIN SOCIETY OF PROFESSIONAL ENGINEERS

1618 W BELTLINE HIGHWAY • MADISON, WISCONSIN 53713 • (608) 251-7872

AFFIDAVIT

OF

WISCONSIN SOCIETY OF PROFESSIONAL ENGINEERS

STATE OF WISCONSIN
COUNTY OF DANE

I, Roger E. Krempel, being first duly sworn, deposes and states as follows:

QUALIFICATION

AUTHORITY: I am the duly elected President of the Wisconsin Society of Professional Engineers (WSPE) and the Board of Directors has duly authorized and approved this affidavit.

ADDRESS: The office of the Wisconsin Society of Professional Engineers (WSPE) is at 1618 West Beltline Highway, Madison, WI 53713.

ORGANIZATION: WSPE was organized in 1934. WSPE members are registered professional engineers and engineers-in-training in Wisconsin and at the present time the membership numbers over 1,600. WSPE is affiliated with the National Society of Professional Engineers whose membership is over 70,000. Our members practice in education, government, industry, construction, private firms and some are retired but still active in the profession. The members are trained in and have experience in various branches of engineering, such as civil, sanitary, mechanical, electrical, chemical, environmental and their practice includes highway, sanitation solid waste disposal, air purification, hydrology, engineering geology, soil mechanics, transportation, communication, structures, water supply, recreation, airfields, flood control, flood protection, dams, locks, docks, erosion control, lake rehabilitation and every other engineering need of society.

CHARACTER: WSPE is constituted for the advancement and betterment of human welfare in the practice of engineering.

STATEMENT

Nine Foot Channel Project on the Upper Mississippi River

WSPE is keenly aware of the policy of the federal government to develop our rivers for transportation, recreation, power, flood control, etc.

Serving The Profession In The Public Interest

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 265

The policy of developing inland river navigation was initiated about 1824. We are aware of the authorization of a three-foot channel for a portion of the Mississippi River in the 1880's, the six-foot channel about 1910 and particularly, the nine-foot channel authorized in 1931 for which twenty-six locks, dams and channels were constructed and are still being operated and maintained. This project made water borne commerce possible from Minneapolis-St. Paul, points on the lower Minnesota and St. Croix Rivers to all points on the inland waterway system, and the seaport of New Orleans and the intercoastal waterways. In fact, to all ports of the world.

Channel Maintenance

Through the natural geologic process, drift and sediments are carried downhill by various channels into creeks and rivers to the ocean, but some of the material is deposited between origin and the ocean. Also, due to natural variations such as rate of increase and decrease of flow, volume and duration of flow, time of year, frequency of changes and other variables influenced by all of MAN's past and present activities, sedimentation is also varied, both as to volume and location. Therefore, it is necessary to remove these materials by dredging to maintain the navigation system. Substantially, all dredging is done with a hydraulic dredge and the sediment, predominantly sand, is disposed of via pipeline to areas adjacent to the river. The Corps of Engineers' representatives have stated the dredging cost is currently approximately $.35 per cubic yard. This is considered to be a reasonably low cost.

Water Borne Commerce

Freight is moved by water transportation with less expenditure of energy than any other mode. The principal bulk products moved on the inland waterway system are grain from our farms, coal to our electric generating stations, petroleum products, chemicals, cement, sand, gravel, steel, fertilizers to our farms, machinery and even the huge nuclear reactors for generating electricity are moved by water as they are too large for any other mode.

Time and space only permit the mention of the large benefits of the project to commercial and sport fishing, boating, hunting, etc.

Litigation Initiated by Wisconsin

In the summer of 1973, Wisconsin, through the Department of Natural Resources, requested an injunction to stop maintenance dredging in Wisconsin. This was brought under the broad provisions of the National Environmental Policy Act (NEPA). A temporary injunction was granted and dredging was stopped. The injunction was lifted about ten days later but litigation is still pending, with court proceedings scheduled for early February.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 265

Effect of Stopping Maintenance Dredging

To discontinue maintenance dredging would substantially stop movement of freight by water on the Mississippi River. WSPL believes that there is not enough available knowledge about the behavior of rivers to predict that discontinuation of dredging would improve the environment, particularly the environment associated with recreation. The behavior of large rivers is very complex and there has been an acceleration in research to obtain knowledge that would permit more reliable predictions of the effect of various designs and operations. The application of present engineering knowledge (experience) permits a reasonable prediction that to stop dredging might actually reduce the quality of the environment desired for recreation.

Stopping of water borne commerce would be disasterous to the mid-continent of America and would have a major adverse affect on our friends and neighbors in the United States and around the world. Discontinuance of dredging, either on an emergency or maintenance basis, would have a significant impact on our social-economic environment.

Alternatives for Dredging

Various suggestions have been made as to alternative methods of dredging and disposal. The alternative most often considered is to dispose of the sand outside the flood plain. The Corps has stated the use of this method would increase dredging costs about ten times. Since we live in a technological age, cost is a measure of the energy required. Nevertheless, alternatives would first have to be studied, formulated, evaluated and recommended to higher authority. Then public hearings, reports, approvals, authorization; then appropriations for planning, design and reports, appropriation for higher costs of dredging, land purchase, acquisition of additional construction equipment and engineering planning for each location to be dredged would have to occur before any new method could be placed in operation. A realistic schedule for changing the method of dredging and disposal should be developed.

Natural Resources

The use of ten times as much irreplaceable energy for the dredging, for a small gain in the rate of change in the environmental features, is considered unwise.

Law

Engineers have experienced many instances of long delays in obtaining NEPA approval on environmental projects such as water supply, sanitation and others critical to public health. These extensive delays can cause significant environmental deterioration. Improvements in the law and administration are being recommended by due process.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 265

CONCLUSION

It is the considered judgment of the Wisconsin Society of Professional Engineers that representatives of the litigants should proceed immediately to reconcile their differences by sitting down together to review all possible alternatives and following a thorough analysis, select the least environmentally destructive as a basis to proceed until all differences can be brought to a more mutually satisfactory resolution. Such action is regarded by WSPE as absolutely essential to safeguard both the environment and the economic welfare of the mid-continent area which is substantially and significantly dependent upon the trade and commerce of the Mississippi waterway. Failure to provide for a nine-foot channel is potentially disasterous to the prosperity of the upper Mississippi Valley area.

Wisconsin Society of Professional Engin

Roger E. Krempel

Roger E. Krempel, P.E., President

State of Wisconsin

County of Dane

On this 1 day of February, 1974, Roger E. Krempel appeared before me and signed the above affidavit.

Notary Public

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 265

AMERICAN
TRUCKING
ASSOCIATIONS, INC.

1616 P Street, N.W., Washington, D. C. 20036

RESEARCH AND TECHNICAL
SERVICES DIVISION
Edward V. Kiley,
Vice President

DEPARTMENT OF RESEARCH
AND TRANSPORT ECONOMICS
Allan C. Flott, Director
(202) [illegible]

April 22, 1974

District Engineer
St. Paul District Corps of Engineers
1210 U. S. Post Office and Custom House
St. Paul, Minnesota 55101

Gentlemen:

In response to your letter of April 12 to Mr. Allan C. Flott, we are submitting the enclosed comments on the Draft Environmental Impact Statement as suggested. These comments are submitted on behalf of the Minnesota Motor Transport Association and the American Trucking Associations. If there are any questions concerning our position, we will be happy to discuss them with you.

Very truly yours,

John L. Reith

John L. Reith
Assistant Director

JLR:jh

Enclosure

cc: E. V. Kiley
James Denn, Minnesota Motor Transport Assn.

A National Federation Having an Affiliated Association in Each State

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 266 LETTER OF COMMENT
AMERICAN TRUCKING ASSOCIATIONS, INC.

STATEMENT ON DRAFT ENVIRONMENTAL IMPACT STATEMENT, OPERATION AND MAINTENANCE OF 9-FOOT NAVIGATION CHANNEL, UPPER MISSISSIPPI RIVER.

In the section entitled, "Barge Transportation and Energy Use," and subsequent sections extending from page 275 through 283, the statement explores the energy implications of shifting present barge traffic to rail transportation service. The discussion stems from and is essentially based on the energy intensiveness figures shown on page 276. The discussion accepts these figures at face value as given relationships representing the energy consumption of the various modes of transportation. In fact, however, analysis of the underlying data which was used to prepare the table on page 276 and the somewhat conflicting table on page 283 will indicate that both of these purport to be the energy consumption required in line-haul transportation service by the various modes. To the extent that additional pickup and delivery service is required in some transportation modes, the energy use for this service is not included in the table shown.

Secondly, the entire discussion assumes that BTU's per ton-mile is a legitimate means of comparing the energy intensiveness of the various modes of transportation. In fact, the statement assumes that this measure is the only measure of such energy intensiveness. Such an assumption is at the very least open to serious question.

Comparisons of relative fuel consumption per ton-mile by mode of transport are not only irrelevant, and misleading, they are dangerous because they appear to be legitimate. Thus a statement that railroads can produce four times so much transportation per gallon of fuel than can trucks is impressive, especially so when it is uttered by no less an authority than the U. S. Secretary of Transportation. Properly analyzed, however, its fallacious

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 266

nature is apparent.

The fallacy of the claim, that the number of tons that can be moved one mile per gallon of fuel is indicative of relative efficiency, is that it ignores the fact that tons come in many shapes, sizes and values. Transportation does not consist of producing ton-miles any more than manufacturing consists of producing tons. Anyone who attempted to compare the importance, or efficiency of a steel mill with that of a clothing plant in terms of tons produced, per gallon of fuel, man-hour, or dollar of investment would be looked upon with a good deal of suspicion as to his sanity. Because it would be quickly recognized that such comparisons are invalid, his veiws would be ignored. Yet, in transportation, we find equally invalid comparisons of the relative importance and efficiency of different forms of transportation based upon the number of tons carried and the distance they move being made and accepted by persons who should know better.

With this kind of simplistic thinking being advanced by those to whom the press and the public looks for guidance, is there any wonder that widespread confusion exists about our National Transportation System.

The truth is that transportation is just as diverse as any other major segments of our economy. It is easily recognized that farming, manufacturing, trade and mining include a great number of dissimilar kinds of operations. A dairy farmer is no more similar to a sugar beet farmer than a steel mill is similar to a lumber mill. Thus, railroads, truck lines, pipelines, water lines and air lines are all in the bsuiness of transporting freight but this does not mean that the services that they provide are similar or competitive.

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It is certain that the importance of the different kinds of movements or their relative efficiency cannot be determined with so crude a measuring stick as the number of tons moved multiplied by the distance they move.

What relevance is there to the fact that a pipeline can move petroleum products between two given points for less fuel per ton per mile than a railroad would require to move steel casting between different points per ton per mile? What relevance is there in comparing the number of gallons of feul required to move a ton of coal between a mine and a power plant with the number of gallons of fuel required to move a ton of assorted merchandise between rumerous producers, sellers and consumers?

The important questions to keep in mind when attempting to compare the relative importance or efficiency of various types of transportation are: (1) What are the alternatives? and (2) How could the needs which prompt the movements in question be satisfied most efficiently, all things considered? When these criteria are applied it will be found, we believe, that the several forms of transport are currently handling the kinds of traffic they can handle best and that the amount of traffic that could be shifted from one form to another with improved fuel or other economies is relatively small.

In any event, these criteria provide clear evidence that BTU consumption per ton-mile for line haul transportation is a completely inadequate measure for determining energy efficiency of the various modes of transportation.

The Environmental Impact Statement is concerned only with the trade off between barge movement and rail for bulk commodities other than in a two-sentence statement on page 277. It is suggested that references to the energy intensiveness tables should be deleted. Alternatively, since the report is clearly directed to analysis of competition between barge lines and rail carriers, the discussion and figures cited might be limited to these two modes. If references to other modes are to be included, we submit that further documentation is necessary to justify the statements made in the first paragraph on page 277.

JLR:jh

4/22/74

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 266

H. L. GOODELL
934 E. DIVISION
SPARTA, WISCONSIN 54656

CONSULTING ENGINEER

April 17 ,1974

District Engineer
U.S.Army Corps of Engineers
1210 U.S.P.O. & Custom House
St. Paul, Minn. 55101

Ref:- NCSED - ER
Subject:- Draft of Environmental Impact Statement,Operation and Maintenance 9 ft Channel, Mississippi river, St. Paul District.

Dear Sir:-

The following comments on the subject are respectfully submitted.

The reader is entitled to know the qualifications of each contributor. Therefore a brief resume of my career is attached. The comments will of necessity be based on the 50 years of experience from wide and active application of engineering to provide effective structures and operations to manage rivers for some of man's basic needs and protection.

The Wisconsin Society of Professional Engineers submitted an affidavit based on the facts of maintenance dredging and the need to continue the operation for a reasonable time, during which alternatives can be deliberately evaluated and changes in methods adopted, which could be reasonably expected to minimize the impact on the environment. I believe the facts stated, the problem areas described, the predicted impact resulting from the improper evaluations of alternatives, and the recommended proceedures for solutions, are in accordance with the best elements of our heritage.

During the last several years, and particularly during the last ten, there has been much wide spread discussion of a desire to preserve the environment, with respect to vegetation,animals (other than man), aesthetics, recreation, fishing, hunting etc. This has been good and concern for these elements should continue.

Affects of the relationship between demand and the inadequate supply of energy, experienced during the past six months, is evidence, however, that the total environment involves much more than that described above. This period demonstrated how the scarcity of energy can adversely affect our living habits. It also revealed the relative insignificance of the undesirable conditions which result from the present method of dredging and disposal. For sure, the adversities of dredging are subtle and noncritical, and will remain so for several years.

H. L. GOODELL
634 E. DIVISION
SPARTA, WISCONSIN 54656

We live in what has been characterized as the "push-button-age". It started in the dim past and continued at a slow rate of development for ages by employing fire, wind, water currents and animals to increase man's capability to serve his neighbors. Recognized authorities stated recently that each individual, on the average, is served by the consumption of energy equivalent to the services of 500 people. This means that over 99% of all effort comes from coal,oil,gas, uranium etc. mined from the earth. In the United States probably less than 1% of energy comes from vegetable matter. Today the use of irreplaceable energy is absolutely essential before food and shelter and other basic needs are produced and distributed among the people.

Former Secretary of the Interior, Stewart Udall, spoke at Murray State College, Kentucky April 3,1974, and stated:-"This nation runs on oil and there will never again be anything like oil and gas---the nation actually has only six years of oil left, using it at the present rate--".

The Summary of alternative methods considered, starting with subparagraph a on page 573 and ending with e on page 575, reveal that alternatives to present method could increase cost (energy consumption) 5,7,11 or 12 times. Based on our newly acquired knowledge of the necessity to practice conservation in the use of irreplaceable energy it would be INHUMAN to adopt any of the alternatives.

It is my judgment that proper studies will result in the adoption of a combination of the methods discussed in the draft of the EIS. It is also my judgment that 5 years will be required to develop and place in operation any significant beneficial change in methods for maintaining the navigation project and disposing of the sediments,to hold the summation of all adverse effects on the environment to a minimum. This of course should include the consumption of energy. Hastily made changes without proper analysis could greatly increase the damage to the environment. However,it is my judgment that changes can be started in the late spring of 1975 and over the five year period the system can be gradually changed. The maximum application of available knowledge will be necessary in attempts to minimize costs (use of irreplaceable energy resources.)

Reference last sentence, second paragraph on page 502. This implies that a sediment deposition structure on the Chippewa has little potential of being an effective aid in establishing the location of acceptable disposal areas or minimizing the cost of new methods. However, it is beleived such a structure has the best potential and thorough consideration of this method should be made, not only for the Chippewa but for all other sizeable tributaries.

Reference third paragraph page 502. The description implies locations of structures in the navigation cahnnel. It is my judgment such barriers would have high cost-effectiveness ratios and should be assigned a low priority in further studies.

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 267

H. L. GOODELL
434 E. DIVISION
SPARTA WISCONSIN 54656

Reference paragraph 5. Alternatives, page 335. Further consideration of the alternative under a is unthinkable. Alternatives in a and b are major and properly considered the responsibility of the United States Congress.

Judgments as to some of the other alternatives for effectiveness within a reasonable time are tabulated below:

Alternative	Cost-effective ratio	Recommended priority for further consideration
Revegetation	Very low	Very low
Commercial use of sand	Zero	Zero
Shore protection	Very low	Very low
Watershed land treatment	Nil	Zero
Central disposal	Very low	Low

Experience during the recent energy crisis has started a reevaluation of the environment. The adverse effects of unnecessary increases in the use of energy and the failure to conserve energy will receive the focus of attention of large masses of people for the next several years. This will continue until a capability is developed to produce a dependable supply.

Reference paragraph starting in line 5 page 578. In spite of present technology and capability to analyse certain statistics, it is my judgment that we are unable to measure or make reliable estimates of differences between existing conditions and those that might have occurred had there been no activity to produce certain benefits by the construction, operation and maintenance of the navigation system. This would involve predictions of the effects of land use throughout the watershed, growth of urban and rural areas the evolving culture,transportation systems, fish and wild life habitat and population, sedimentation, drifts, high water and all other phenomenon. It is my judgment that the results of all man's activity has been good and that the local environment is as good or better than would otherwise occurred without the locks and dams. The amount of sediment deposited in the valley since 1940 between St. Paul and Guttenburg, Iowa is probably no different than would have occurred without the 9 ft channel project. The pattern of deposit is probably different due to the locks and dams, and this might be beneficial rather than adverse. Without the navigation system it is my judgment there would be fewer fish, wild animals and birds; less boating, more drifts and sand bars,shallower depths during low flow(the Indians used canoes) and probably greater flood heights.

During National Engineers Week in February, the theme was "Engineering is our greatest resource". However, unless this resource is used and developed it will deteriorate to the extent that we could not cope with the environment.

It is recommended that Consulting Engineers be employed to study, develope, evaluate and recommend dredging and disposal operations for the future maintenance of the 9 ft channel project and the associated benefits that might accrue.

CORPS OF ENGINEERS
ST. PAUL DISTRICT
EXHIBIT 267

H. L. GOODELL
634 E. DIVISION
SPARTA, WISCONSIN 54656

In summary, there is ample reason to be exceedingly grateful for our heritage. No doubt improvements can be made but due to the complexity of the environment, including the energy situation , any changes should be made only after thorough study and deliberation.

Respectfully submitted,

H L Goodell

H.L.Goodell,P.E.

CORPS OF ENGINEERS

ST. PAUL DISTRICT
EXHIBIT 267

John W. Gorman, Inc.

1209 WEST 78½ STREET • MINNEAPOLIS, MINNESOTA 55420 • PHONE 888-2816

April 17, 1974

Colonel Rodney E. Cox, District Engineer
St. Paul District, Corps of Engineers
St. Paul, Minnesota

Re: Environmental Impact Statement
for
Operation and Maintenance of the
Nine Foot Navigation Channel, Upper
Mississippi River, Head of Naviga-
tion to Guttenberg, Iowa.
February, 1974

Dear Sir:

I have reviewed the Environmental Impact Statement, and I am forwarding my comments regarding portions of the subject matter.

I am quite familiar with the reach of the river system from La Crosse, Wisconsin to the Twin Cities, and the enclosed exhibit, references, and commentary are confined to this area. General observations from travel experience and study of mapping indicate similar conditions prevail on other reaches of the river system.

The subject matter of this commentary relates to two topics reported in the Environmental Impact Statement:

1. Sedimentation.
2. Dredging procedures.

The Upper Mississippi Valley system within the subject area is a mature drainage system with the exception of the Twin City area, which was developed during the passing of the later glacial periods.

The hydraulic flows within this system have varied greatly during its geological formation. The flows seen today are a mere trickle of water when compared to past flows that established the main valley and its tributary system.

page 1

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Tremendous [illegible] masses of water carved out the large valleys of the Mississippi and its principal tributaries to depths far greater than is apparent at this date.

Other huge glacial flows later carried massive amounts of sediments into these valleys. These sediments extend from several hundred feet below to approximately 100 feet above the present valley floors.

These alluvial deposits were partially removed by the latest stages of the high glacial flows, leaving terraces and high alluvial sand plains throughout the drainage system.

These alluvial deposits erode readily and are the main source of inflow sediments clogging the Mississippi River navigation channel and back waters.

A map of the Mississippi River from Hastings, Minnesota to La Crosse, Wisconsin, accompanies this commentary and notes the major high plain deposits and valley sand prairies and islands. These areas are shaded in red on the map. These deposits reach well beyond the extent of the mapping in the tributary valleys. Field reconnaissance and more detailed mapping will reveal many more such areas.

The Environmental Impact Study takes particular note of the inflow of these alluvial deposits from the Chippewa tributary system. This system is one of the principal contributors of sedimentary deposits to the main stem Mississippi Valley. All the other tributaries contribute similar deposits, particularly during periods of high volume spring runoffs and during flash floods.

The Zumbro system which enters the Mississippi in Pool 5, immediately upstream from the West Newton - Buffalo City area, has poured large amounts of alluvial deposits in the valley floor of its delta, and into the main channel and the adjoining backwater sloughs.

Pools 6, [illegible], and 8, are bordered on the Wisconsin side by one of the largest alluvial sand plains in the Upper Mississippi Valley.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 268

AD-A133 512 OPERATION AND MAINTENANCE 9-FOOT NAVIGATION CHANNEL UPPER MISSISSIPPI RIV..(U) CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT AUG 74 7/7

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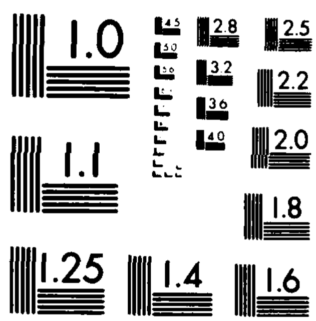

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

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This plain completely covers the main valley floor at Trempealeau, Wisconsin, and extends downstream through La Crosse, Wisconsin. Two tributaries, the Black River, and the La Crosse River, slice through this plain, and the Trempealeau River borders its upstream edge.

The silted Gibbs Slough location described in the Environmental Impact Statement is at the mouth of the Trempealeau River.

The mouth of the Black River at La Crosse has been dredged repeatedly for years, providing granular embankment material for highway construction and industrial sites at that location.

The Black River along with the La Crosse River and the Root River enter Pool 8 on the Mississippi just above the Brownsville area that is currently one of the maintenance problems.

Stabilization of all of the tributary systems is the key to reduction of the inflow of sediments to the Mississippi channels.

The sediments within the Mississippi channels and spoiled along their banks will continue to shift along the stream, particularly during high water periods when flows are enlarged and accelerated.

Maintenance dredging will be required to maintain the present navigation and backwater channels for time unknown.

The Environmental Impact Statement has developed several alternate plans for the disposition of the channel sediments, varying from a slight variation of present methods to the extreme measure of complete removal of sediments from the valley floor. The feasibility of initiating the latter is unlikely. Its cost is prohibitive and unwarranted.

The Environmental Impact Statement notes that certain benefits have developed from present spoiling methods. These should be recognized and utilized along with a specific regard for the preservation and restoration of the natural settings of the valley.

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A moderate plan that is feasible to operate is a necessity.

In regard to dredging procedures, the Environmental Impact Statement has studied the comparative costs, capability, and utility of using Corps of Engineer plant versus using construction industry contract forces. It is noted that contract procedures are more costly and cumbersome to operate.

The construction industry's costs to date are definitely higher, due to the fact that it's portion of the dredging activity has been either small, isolated projects requiring a high percentage of mobilization costs, or the projects have been of a nature involving materials costly to handle with difficult spoiling requirements.

A reassessment of these values should be made on the basis of the scope of work encompassed n the amount of construction activity required to continue the channel maintenance schedule and rehabilitation of backwater channels.

A reviewal of contract procedures should be made to make the capability of contract forces a more flexible tool to use for your needs as a companion force for your present plant.

The construction industry in this area is versatile and has been able to adapt itself readily to any given type of project.

The Corps of Engineers has access to a vast amount of knowledge, historical data, and construction experience, through its own work, allied agencies, contract construction, and engineering organizations. Proper use of this accumulated data and experience by your technical forces will surely solve the current problems you are facing.

I wish you well with this project.

Yours very truly,

John W. Gorman

John W. Gorman

CORPS OF ENGINEERS — ST. PAUL DISTRICT

EXHIBIT 268

MINNEAPOLIS GRAIN EXCHANGE

104 GRAIN EXCHANGE BUILDING

MINNEAPOLIS, MINNESOTA 55415

TRAFFIC DEPARTMENT

March 22, 1974

Col. Rodney E. Cox, District Engineer
Corps of Engineers
1210 U.S. Post Office & Custom House
St. Paul, MN 55101

Comment on Draft Environmental Impact Statement
Operation & Maintenance, 9 Ft. Navigation Channel

Dear Col. Cox:

The Minneapolis Grain Exchange appreciates your sending us a copy of the Draft Environmental Impact Statement on Operation and Maintenance of the 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Ia., dated February, 1974.

This 2-volume study is a monumental achievement, and the Corps is to be congratulated on the amazingly thorough job you and your associates, with the assistance of the North Star Research Institute and other participants, have done in presenting a very well-balanced view of the ecological, economic and social impact of the 9-ft. channel project up to this time, present and future problems and opportunities, and a well-researched analysis of the probable costs and effects of various future courses of action.

The study is so extensive, and appears to summarize so accurately the technical data and informed opinion contributed by highly qualified experts in so many river-related fields that any extensive comment would be superfluous.

The primary interest of Northwest farmers and of agribusiness generally is of course to assure the continuation of economical commercial navigation on the river. My comments of Dec. 12, 1973 on the vital importance of this great transportation artery are quoted extensively at Pages 281-282, and subsequent developments have served only to reinforce the validity of the statements and projections I submitted at that time, so very little more remains to be said.

As the Draft Statement very correctly notes at Page 177, "The ramifications of river navigation reach deeply into the entire economy of the entire Upper Mississippi River region." They do indeed. The river is as important and often much more important to a grain farmer in North Dakota (and the local merchants who share in his economic well-being) as it is to the good citizens of Minnesota or Wisconsin who live along its banks or the visitors who on occasion enjoy the recreational opportunities it offers.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 269

LETTER OF COMMENT
MINNEAPOLIS GRAIN EXCHANGE

Starting at Page 335, the Draft Statement discusses alternatives to the existing method of operating and maintaining the 9-foot channel navigation project. Three broad alternative categories are identified:

a) Cease all operation and maintenance activities.
b) Provide a navigation channel of lesser or greater depth than 9 feet.
c) Provide a 9-foot navigation channel with modifications to the existing operation and maintenance activities.

It is heartening to note with regard to alternative (a), the comment on Page 336 that "Consideration of this alternative would require a major change of primary objectives and have such a great impact on the present socio-economic and natural setting that it is not considered as a reasonable alternative to the present operation and maintenance activities."

With regard to alternative (b), which could involve either a reversion to the former 4½ or 6-foot channel depths or a possible deepening to 12 feet, the Draft Statement wisely concludes that "Going to either of these conditions would cause major socio-economic and natural environmental impacts, some beneficial and some adverse. Because of the controversy concerning the potential impacts that could be involved, these are not considered as reasonable alternatives to operation and maintenance of the 9-foot navigation channel."

That leaves us with alternative (c), and basically the balance of the Statement and most of the very extensive exhibits in Volume 2 represent a commendable effort to present in understandable form a compendium of all of the currently available scientific and economic data upon which the responsible governmental agencies must rely in seeking the most satisfactory solutions to the admittedly serious environmental problems besetting the Upper Mississippi.

As the Draft Statement says at Page 331, "The most significant direct adverse impact of the operation and maintenance of the 9-foot navigational channel is the conversion of aquatic habitats to sandy shoals or islands as a result of the placement of dredge spoil," but "it is impossible to avoid some form of habitat conversion without sacrificing the authorized purpose of the project."

The idea of removing dredge spoil from the floodplain entirely may be superficially appealing, but as the Statement says at Page 386, "The actual desirability of removing the material from the floodplain must be based on the selection of final disposal and utilization sites and the comparison of the net gains and losses involved. Only in those non-floodplain areas which have a high demand and place a relatively high value on this material would there be a potentially practical reason for implementing this alternative." The huge increases in project costs, handling facilities required and energy consumed as well as the generally unfavorable environmental impact at upland disposal sites all seem to make this with rare exceptions the least promising alternative.

Environmentally and politically acceptable solutions to the dredging spoils problem won't be found quickly, because, as the Draft Statement explains, much additional research remains to be done, and also because "Each use would prefer to have the sedimentation process of the river handled in a different manner." In other words, picnickers, fishermen, swamp bird lovers, sunbathers, clam harvesters, duck hunters and towboat operators tend to evaluate quite differently the merits or demerits of an exposed sandbank along the shore of a river — and all of them vote!

"Complete coordination bv all affected interests" is of course the goal to be desired, and we couldn't agree more that"Wise selection of disposal areas needs to be based on an interdisciplinary approach" (P. 371). Hopefully, all interested parties will heed the very sound admonition (P. 372) that "Fewer opposing viewpoints and basic cooperative attitudes would help to develop the entire river system for the maximum overall public benefit."

Congratulations on a difficult job well done!

Yours very truly,

D. J. Russell

D. J. Russell
Director of Transportation

DJR:eh

P. S. Are you sure that picture on P. 189 was taken in 1973?

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 269

MISSOURI PACIFIC RAILROAD COMPANY
THE TEXAS AND PACIFIC RAILWAY COMPANY
CHICAGO AND EASTERN ILLINOIS RAILROAD

210 NORTH 13TH ST ST LOUIS MISSOURI 63103
TEL AREA CODE 314 622 2431

J. A AUSTIN
VICE PRESIDENT-TRAFFIC

March 28, 1974

File: LB-Environmental Impact
Statement; Upper
Mississippi River
(Head to Guttenberg, Ia.)

Colonel Rodney E. Cox
District Engineer
St. Paul District Corps of Engineers
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

Reference your notice of February 21, 1974, seeking comments on the draft Environmental Impact Statement (EIS) for Operation and Maintenance of the 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa.

There are numerous errors in the draft EIS as it relates to energy consumption and air pollution barge vs. rail transportation. Our comments will be confined to those two subjects.

On page 276 of the draft, BTU intensiveness of various transport modes is presented with the conclusion that motive energy is used more efficiently in water transportation. The source document is referred to as "a 1973 report by the Rand Corporation of Santa Monica, California."

To set the record straight, we submit the data referred to initially was published in the Rand Corporation study R-804-NSF, December, 1971.

The two most publicized studies of energy consumption by transport mode are:

1 - RAND CORPORATION - Dr. W. E. Mooz (December, 1971). The Effect of Fuel Price Increases on Energy Intensiveness of Freight Transport.

2 - OAK RIDGE NATIONAL LABORATORY - Dr. Eric Hirst (April, 1973). Energy Intensiveness of Passenger and Freight Transport Modes.

BTU consumption by transport mode, as reported in the involved studies, is shown below:

TRANSPORT MODE	BTU PER TON MILE RAND	ORNL
Waterway	500	680
Railroad	750	670
Pipeline	1,850	450
Truck	2,400	2,800
Air Cargo	63,000	42,000

We find the ORNL factors for waterway and railroad to be correct. There are two significant errors in the Rand study:

1 - It did not account for duplications in traffic data reported by the Corps of Engineers on tonnage moving jointly on the inland waterways, Great Lakes and/or coastal/coastwise. This resulted in overestimating waterway ton-miles and underestimating BTU consumption per ton-mile.

2 - It did not subtract energy used for rail passenger service, which overestimated total fuel and BTU per ton-mile consumed for rail freight traffic.

There is a discrepancy in the waterway ton-mile statistics presented in Table 10, page 23, of the Rand study (see Exhibit I attached). In analyzing the Rand source documents, i.e., Statistical Abstract of the U. S. (Bureau of Census), and Inland Waterborne Commerce Statistics (American Waterways Operators), we discovered the "Coastal and Coastwise" ton-miles for 1957 through 1968 included duplication of ton-miles reported under "Inland Waterways" on traffic that had movements on inland waterways and/or Great Lakes and coastal or coastwise.

We are concerned that the American Waterways Operators, in their annual publication of waterborne commerce statistics, would include ton-mile duplications, while specifically stating identical shipments over two or more waterways had been eliminated.

Attached are copies of documents that prove this point:

1 - Inland Waterborne Commerce Statistics, 1969 edition (American Waterways Operators), reports 175 billion ton-miles (BTM) for inland waterways, 107 BTM for Great Lakes and 310 BTM for coastal/coastwise; a total of 592 BTM for year 1967. (See Exhibits II and III.)

2 - Waterborne Commerce, Part 5, year 1967 (U.S. Corps of Engineers), reports 130 BTM - inland waterways, 75 BTM-Great Lakes and 310 BTM-coastal/coastwise; a total of 515 BTM. Thus, 77 BTM that were generated in coastal/coastwise movements were also counted in the inland waterways and Great Lakes traffic. (See Exhibit IV)

3 - The problem of duplications in waterborne ton-miles is further clarified by the attached documents published in the October, 1973, edition of Transportation Facts and Trends. (See Exhibits V and VI.) Using a total of 515 billion ton-miles and 337,145 billion BTU produces a revised year 1967 consumption factor of 655 BTU for waterway transport.

You probably are familiar with the Department of Transportation Report of September, 1973, entitled "Energy Statistics, A Supplement To The Summary of National Transportation Statistics," Report No. DOT-TSC-OST-73-34. This study accepts the Rand study BTU consumption factor only for truck and the ORNL factor for rail, water and pipeline, as indicated below:

ENERGY INTENSIVENESS BY FREIGHT TRANSPORT MODE

MODE	BTU/NET TON-MILE
Rail	670
Water	680
Oil Pipeline	450
Truck	2,400

There is a significant factor that has not been considered in any of the energy intensiveness reports to date, and that is average BTU consumption per net ton-mile alone is not an accurate comparison between water and rail transportation. Water interests have been silent about inland barge and coastwise vessel mileage circuity over rail mileage between common points. As information, attached Exhibit VII compares barge versus rail miles from five representative origins on the Upper Mississippi River to eleven representative destinations on various waterway systems. These movements were selected from actual barge shipments reported in Part 5, Waterborne Commerce for 1972. (In some instances the actual movement was upbound in lieu of downbound.)

For the involved 55 movements, barge miles exceed rail miles by 29.1 percent. Utilizing the ORNL factor of 680 BTU for waterway, plus a mileage circuity factor of 29.1 percent, produces waterway consumption of 878 BTU per net ton-mile between barge and rail common points on movements involving the Upper Mississippi River as an origin or destination.

As you know, very little barge tonnage originates and is consumed at river bank points; therefore, an additional BTU factor would have to be added to cover energy consumption on a substantial amount of water traffic that must move considerable distances either to or from the waterway. Such movements generally are by the least fuel-efficient surface transportation mode - truck.

In view of the foregoing, it would be proper to revise the EIS to reflect the fact that rail is more energy efficient than barge, or any other mode of surface transport.

Other comments are presented below:

1 - See draft page 277. "If the costs of energy rise sufficiently, increased capital necessitated by use of the slower moving barge transportation and increased capital tied-up in inventory and storage space may be justified." We disagree. Fuel expense for a 4200 horsepower towboat currently represents approximately 36 percent of total annual operating cost (excluding depreciation and interest). Fuel expense for rail is approximately 7 percent of total annual operating cost (excluding depreciation, equipment and joint facility rents). Thus, it is apparent that increased fuel prices will have a much more adverse effect on barge operating costs, and resulting rates to shippers, than rail.

2 - See draft page 277. "The role of the Upper Mississippi River as a transportation artery is shown by the burden which would be placed on the rail system . . . in the absence of barge traffic on the river." We believe a proper investigation of the rail system in the Upper Mississippi River area will reveal there is adequate capacity to accommodate barge traffic from and to the St. Paul District and other districts. Railroads, like barge and truck operators, do not purchase equipment for traffic that does not exist. In the absence of barge transportation in this region, there is no reason to believe the railroads would not have the capacity or wherewithal to handle the added traffic. In 1973 U. S. railroad capital spending was $1.35 billion, an increase of 11 percent over 1972. Expenditures for new equipment, cars and locomotives, totalled about $910 million and roadway improvements accounted for another $440 million. In addition to the railroad investment in rolling stock, another $500 million was spent by leasing companies and private car lines, including those which are railroad subsidiaries.

3 - See draft page 278. "Among users of diesel engines, barging probably is more efficient than either rail or truck." (Refers to air pollution) This is an assumption that is not documented with fact. While rail locomotives and towboats primarily consume the same type fuel (No. 2 distillate fuel oil), barge miles on traffic to and from points on the Upper Mississippi River exceed rail miles by 29.1%. Thus, while a rail shipment would move say 1,000 miles, the equivalent barge movement would involve 1,291 miles. Consequently, rail transport is the lesser contributor to pollution.

In 1972 the U. S. railroads spent $92 million to improve the environment. We anticipate the 1973 figure will greatly exceed this amount.

4 - See draft page 333. "The increasing probability of spills from barge transportation is recognized from some viewpoints as an unavoidable consequence of the operation of the project." We are concerned that while the involved report supposedly constitutes an environmental impact statement, very little consideration was given to recoverable and non-recoverable spills of hazardous polluting substances in the waterway. Reference is made to transportation economics in the absence of the 9-foot project. However, no effort apparently was made to quantify the adverse effects of pollution as the result of hazardous materials spills in the waterway, with and without the 9-foot project.

All things considered, there is little doubt fuel consumption and pollution in transportation from producer to ultimate consumer, rail versus barge or barge-truck, finds rail far more efficient by a wide margin.

When the final EIS is completed in June, 1974, we sincerely hope it contains the facts as covered by our comments.

Yours very truly,

J A Auston

cc: Upper Mississippi River Basin Commission

Mr. Claude S. Brinegar, Secretary of Transportation, Department of Transportation, 400 Seventh Street, S. W., Washington, D. C. 20590

Mr. William D. Ruckelshaus, Administrator, Environmental Protection Agency, Waterside Mall, 401 M Street, S. W., Washington, D. C. 20460

Mr. Warren D. Fairchild, Director, U. S. Water Resources Council, 2120 L Street, Washington, D. C. 20037

And other interested parties

EXHIBIT I

Table 10

FREIGHT MOVEMENTS AND ENERGY CONSUMPTION
IN DOMESTIC WATERBORNE TRANSPORTATION

Year	Freight Movement (millions of ton-mi) Inland Waterways	Coastal and Coastwise	Total	Energy Used (billions of Btu)[a]	Energy Intensiveness (Btu per ton-mi)
1957	231,792	299,915	531,707	325,245	612
1958	189,016	304,770	493,786	---	---
1959	196,559	313,749	510,308	489,863	960
1960	220,253	313,208	533,461	274,553	552
1961	209,706	311,999	521,705	257,518	494
1962	223,089	317,400	540,489	---	---
1963	234,172	316,096	550,268	234,839	427
1964	250,165	311,874	562,039	292,171	520
1965	262,421	302,545	564,965	218,387	387
1966	280,527	306,766	587,293	264,739	451
1967	281,400	310,429	591,829	337,145	570
1968	287,000	304,450	591,480	---	---

SOURCE: Table 801, *Statistical Abstract of the United States, 1969*, 90th ed., U.S. Bureau of the Census, Washington, D.C., 1969; *Inland Waterborne Commerce Statistics*, 1969 ed., The American Waterways Operators, Inc., Washington, D.C., p. 4.

[a]From Table 9.

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 270

EXHIBIT II

TRAFFIC TRANSPORTED ON INLAND WATERWAYS OF UNITED STATES (EXCLUSIVE OF GREAT LAKES) FOR CALENDAR YEARS SHOWN 1/

Year	Net Tons of 2,000 Pounds 2/	Ton-Miles
1931	179,135,000	9,233,369,320
1940	366,835,582	22,411,961,000
1947 3/	262,282,074	34,548,917,000
1950	297,694,832	51,656,637,000
1954	319,780,826	62,503,839,000
1955	362,555,910	97,662,567,000
1956	384,097,615	109,313,274,000
1957	391,889,975	114,561,469,000
1958	366,493,823	109,131,151,000
1959	389,015,388	116,676,739,000
1960	395,250,101	120,764,337,000
1961	387,981,193	122,666,905,000
1962	418,339,106	133,039,652,000
1963	430,883,108	138,880,956,000
1964	457,495,630	144,230,677,000
1965	477,480,483	152,812,240,000
1966	489,066,210	164,526,796,000
1967	500,912,733	174,562,975,000
1968	520,904,639	179,336,707,000
1969	548,481,358	187,666,323,000

1/ Approximately 28.5 percent of traffic transported on inland waterways is moved in deep-draft oceangoing vessels using 8,766 miles of channel, which exceed the 9-foot standard depth for towboat, tugboat, barge operations.

2/ Known duplications resulting from reporting of identical shipments over two or more waterways have been eliminated except that the figures for 1947 and subsequent years represent originated traffic.

3/ Figures for 1947 and subsequent years appear low as compared with those of previous years for the reason that the traffic for 1947 and subsequent years was compiled by the Corps of Engineers for Rivers and Harbors under a new statistical system with mechanical tabulating processes which analyzed the traffic and eliminated duplications more thoroughly than in the years prior to 1947.

COASTAL AND COASTWISE TRAFFIC 1/

Year	Net Tons of 2,000 Pounds	Ton-Miles
1957	196,418,553	299,915,000,000
1958	194,050,174	304,770,000,000
1959	205,509,011	313,749,000,000
1960	209,196,623	313,708,000,000
1961	206,899,377	311,999,000,000
1962	215,460,682	317,400,000,000
1963	213,853,793	316,096,000,000
1964	205,687,985	311,876,000,000
1965	201,508,107	302,545,000,000
1966	208,374,966	306,766,000,000
1967	214,666,527	310,479,000,000
1968	214,250,535	304,480,000,000

1/ Applies to domestic traffic receiving a carriage over the ocean, or the Gulf of Mexico, e.g., New Orleans to Baltimore, New York to Puerto Rico, San Francisco to Hawaii, or Puerto Rico to Hawaii. Traffic between Great Lakes ports and seacoast ports, when having a carriage over the ocean, is also termed coastwise.

SOURCE: THE AMERICAN WATERWAYS OPERATORS INLAND WATERBORNE [illegible]

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 270

EXHIBIT III

FREIGHT TRAFFIC IN THE UNITED STATES BY RAILWAYS,
MOTOR TRUCKS, GREAT LAKES, INLAND WATERWAYS AND PIPELINES, CALENDAR YEARS
1964, 1965, 1966, 1957 AND 1968 AND PERCENTAGES OF TOTAL

NET TONS IN MILLIONS

Year	Total	Railways Net Tons	Railways % of Total	Motor Trucks 1/ Net Tons	Motor Trucks 1/ % of Total	Great Lakes Net Tons	Great Lakes % of Total	Inland Waterways Net Tons	Inland Waterways % of Total	Pipelines Net Tons	Pipelines % of Total
1964	3,131	1,356	43.3	366	11.7	151	4.8	457	14.6	801	25.6
1965	3,272	1,388	42.4	419	12.8	154	4.7	472	14.4	839	25.7
1966	3,399	1,449	42.6	463	13.6	164	4.8	489	14.4	834	24.6
1967	3,211	1,408	43.8	469	14.6	154	4.8	501	15.6	679	21.1
1958	3,352	1,431	42.7	523	15.6	151	4.5	521	15.5	726	21.7

TON-MILES IN BILLIONS

Year	Total	Railways Ton Miles	Railways % of Total	Motor Trucks Ton 2/ Miles	Motor Trucks % of Total	Great Lakes Ton Miles	Great Lakes % of Total	Inland Waterways Ton Miles	Inland Waterways % of Total	Pipelines Ton Miles	Pipelines % of Total
1964	1,541	666	43.2	356	23.1	106	6.9	144	9.4	259	17.4
1965	1,637	709	43.3	359	21.9	110	6.7	153	9.4	306	18.7
1966	1,746	751	43.1	381	21.8	116	6.7	165	9.3	333	19.1
1967	1,763	731	41.4	389	22.1	107	6.1	175	9.9	361	20.5
1968	1,835	757	41.3	396	21.5	112	6.1	179	9.8	391	21.3

1/Tons of revenue freight carried in intercity service by Class I carriers.
2/Motor Carrier ton-miles for the years of 1964-1967 were revised. (See TRANSPORT ECONOMICS, November-December 1967 issue).

Source: ANNUAL REPORTS, TRANSPORT ECONOMICS and TRANSPORT STATISTICS IN THE UNITED STATES published by the Interstate Commerce Commission

SOURCE: THE AMERICAN WATERWAYS OPERATORS INLAND WATERBORNE COMMERCE

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TABLE 3--DOMESTIC TRAFFIC: TONS AND TON-MILES OF PRINCIPAL COMMODITY GROUPS BY TYPE OF TRAFFIC AND SERVICE CALENDAR YEAR 1967

(In thousands)

Type of traffic and commodity group	Total			Regulated			Exempt, for hire			Private		
	Ton-miles	Tons	Average haul (miles per ton)	Ton-miles	Tons	Average haul (miles per ton)	Ton-miles	Tons	Average haul (miles per ton)	Ton-miles	Tons	Average haul (miles per ton)
Coastwise, total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,171.6	[illegible]	84,339	[illegible]	[illegible]	[illegible]	1,551.0
Petroleum and products	[illegible]	[illegible]	[illegible]	[illegible]	131	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Coal and coke	6,133,173	10,655	[illegible]	[illegible]	[illegible]	754.1	4,856,[illegible]	[illegible]	[illegible]	1,074,[illegible]	1,057	[illegible]
Iron ore and iron and steel	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5,[illegible]	[illegible],411	130	3,[illegible]	[illegible]	[illegible]	1,113.8
Sand, gravel, and stone	[illegible]	6,1[illegible]	73.8	[illegible]	6	2,1[illegible]	342,[illegible]	4,810	71.3	[illegible]	1,3[illegible]	73.3
Grains	1,65[illegible]	642	[illegible]	[illegible]	[illegible]	[illegible]	1,[illegible]	590	2,742.6	170,106	[illegible]	4,619.5
Logs and lumber	[illegible]	2,[illegible]	2,148.0	4,[illegible]	1,2[illegible]	3,[illegible]	903,[illegible]	1,121	806.1	[illegible]	239	[illegible]
Chemicals and related products	16,804,937	10,512	1,598.6	1,[illegible]	1,017	1,948.1	13,374,[illegible]	8,482	1,576.8	1,449,[illegible]	1,013	[illegible]
Shells	1,766	3	[illegible]	101	*	2,148.9	500	1	500.0	1,[illegible]	2	[illegible]
All other	27,557,[illegible]	15,821	1,741.8	6,011,[illegible]	2,857	2,104.2	16,102,543	9,901	1,6[illegible]	5,443,[illegible]	3,063	1,777.1
Lakewise, total	74,7[illegible]	153,597	487.0	[illegible]	6,460	116.2	49,[illegible]	106,550	463.6	24,[illegible]	40,587	607.3
Petroleum and products	1,[illegible]	7,[illegible]	190.9	[illegible]	320	30.1	[illegible]	3,389	166.6	807,[illegible]	3,577	[illegible]
Coal and coke	10,4[illegible]	38,[illegible]	273.4	54,297	318	170.5	9,[illegible]	34,755	[illegible]	7[illegible]	3,[illegible]	233.2
Iron ore and iron and steel	49,[illegible]	[illegible]	743.0	300,477	921	326.2	2[illegible]	37,[illegible]	7[illegible]	21,[illegible]	27,[illegible]	755.0
Sand, gravel, and stone	9,[illegible]	[illegible]	317.1	[illegible]	[illegible]	122.7	8,0[illegible]	25,851	3[illegible]	1,[illegible]	3,[illegible]	[illegible]
Grains	1,[illegible]	2,1[illegible]	870.5	10,[illegible]	[illegible]	69.6	1,871,747	2,0[illegible]	[illegible]	----------	------	----------
Logs and lumber	[illegible]	706	65.0	41,[illegible]	607	69.0	1	*	11.6	3,[illegible]	99	40.2
Chemicals and related products	13[illegible],607	649	204.3	3[illegible]	[illegible]	70.4	96,754	180	537.5	----------	------	----------
Shells	----------	------	----------	----------	------	----------	----------	------	----------	----------	------	----------
All other	1,907,791	8,[illegible]	[illegible]	274,816	3,5[illegible]	78.1	871,925	2,414	361.2	760,948	2,410	315.7
Internal, total	178,[illegible]	378,[illegible]	[illegible]	19,030,362	41,493	458.7	86,613,945	221,197	391.6	22,613,[illegible]	135,903	166.4
Petroleum and products	[illegible]	129,7[illegible]	305.[illegible]	401,150	1,77[illegible]	225.5	29,732,396	100,393	296.2	9,[illegible]	27,[illegible]	346.3
Coal and coke	23,7[illegible]	100,[illegible]	235.6	6,70[illegible]	21,[illegible]	311.7	14,771,816	48,449	303.9	2,[illegible]	30,731	74.4
Iron ore and iron and steel	6,[illegible]	8,737	7[illegible]	5,7[illegible]	5,[illegible]	967.0	855,[illegible]	1,599	535.1	[illegible]	1,158	[illegible]
Sand, gravel, and stone	3,415,1[illegible]	53,[illegible]	63.7	300,[illegible]	2,[illegible]	123.1	1,189,665	14,739	80.7	1,[illegible]	35,[illegible]	51.8
Grains	18,[illegible]	17,[illegible]	1,053.7	1,[illegible]	1,993	964.1	14,827,904	13,[illegible]	1,086.9	1,47[illegible]	1,[illegible]	889.3
Logs and lumber	1,047,218	17,451	60.0	16[illegible]	1,2[illegible]	128.2	532,744	12,334	43.2	[illegible]	3,[illegible]	92.3
Chemicals and related products	14,5[illegible]	22,015	661.1	3[illegible],761	[illegible]	73[illegible]	10,372,840	13,406	773.7	3,[illegible]	8,103	471.9
Shells	1,[illegible]	1[illegible]	[illegible]	4,175	11[illegible]	35.1	[illegible],470	[illegible]	72.7	1,[illegible]	14,[illegible]	[illegible]
All other	[illegible]	[illegible]	579.1	3,2[illegible]	5,1[illegible]	631.4	14,337,[illegible]	16,040	893.9	1,714,[illegible]	1[illegible]	141.1
Local, total	1,[illegible]	102,[illegible]	16.6	26,34[illegible]	1,65[illegible]	16.0	1,006,263	58,87[illegible]	17.1	809,773	41,797	20.8
Petroleum and products	907,7[illegible]	4[illegible]	20.2	7,3[illegible]	33[illegible]	2[illegible].1	656,771	31,655	20.7	2[illegible]	1[illegible]	19.0
Coal and coke	[illegible]	14,[illegible]	8.4	[illegible]	2	24.0	116,211	11,460	10.1	10,[illegible]	3,537	2.9
Iron ore and iron and steel	27,6[illegible]	1,146	24.1	2,602	64	40.7	10,610	343	30.9	14,408	739	19.5
Sand, gravel, and stone	169,1[illegible]	9,7[illegible]	17.3	13	3	4.3	9,2[illegible]	516	17.9	159,957	9,273	17.2
Grains	2,[illegible]	77	27.0	1,[illegible]	39	28.8	1,470	34	43.2	30	[illegible]	1.3
Logs and lumber	25,1[illegible]	5,101	4.9	3,1[illegible]	427	7.5	12,714	3,649	3.5	9,240	1,0[illegible]	9.0
Chemicals and related products	[illegible]	1,7[illegible]	22.1	307	20	15.4	29,636	733	40.4	8,965	1,005	8.9
Shells	[illegible]	8,[illegible]	2[illegible]	----------	------	----------	8,875	405	21.9	192,509	7,621	25.3
All other	403,330	16,[illegible]	24.3	11,743	764	15.4	160,756	10,077	16.0	230,831	5,725	40.3
Domestic, total	515,397,[illegible]	[illegible],157	593.0	36,538,[illegible]	55,[illegible]	654.0	238,318,153	470,958	506.0	240,530,740	342,[illegible]	702.6
Petroleum and products	[illegible]	[illegible]	8[illegible]	610,[illegible]	2,[illegible]	238.5	94,575,090	185,374	510.2	194,0[illegible]	1[illegible]	1,206.1
Coal and coke	40,[illegible]	164,[illegible]	24[illegible]	7,047,197	22,364	315.1	29,3[illegible]	103,909	28[illegible].3	4,120,[illegible]	38,[illegible]	107.0
Iron ore and iron and steel	61,4[illegible]	77,[illegible]	788.[illegible]	9,73[illegible]	7,633	1,27[illegible]	29,[illegible]	40,[illegible]	740.8	22,00[illegible]	30,2[illegible]	728.7
Sand, gravel, and stone	13,3[illegible]	[illegible]	135.0	[illegible]	3,123	126.8	9,6[illegible],451	45,916	209.8	3,[illegible]	49,947	66.7
Grains	21,7[illegible]	[illegible],132	1,07[illegible]	2,037,[illegible]	2,191	9[illegible]	18,1[illegible]	16,276	1,114.2	1,600,[illegible]	1,715	933.0
Logs and lumber	[illegible]	[illegible]	262.5	4,7[illegible]	3,[illegible]	1,332.8	1,[illegible]	17,105	90.0	[illegible]	[illegible]	[illegible]
Chemicals and related products	[illegible]	[illegible]	[illegible]	[illegible]	1,[illegible]	1,203.1	23,[illegible]	[illegible]	1,0[illegible]	5,310,[illegible]	10,[illegible]	[illegible]
Shells	1,[illegible]	[illegible]	[illegible]	4,[illegible]	119	35.[illegible]	[illegible]	1,004	52.7	1,[illegible]	[illegible]	64.7
All other	[illegible]	74,1[illegible]	653.[illegible]	9,[illegible]	1[illegible]	770.3	31,[illegible]	[illegible]	81[illegible]	6,1[illegible]	2[illegible]	349.0

* Less than 500 tons.

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Bus: 1972-1967 - Same source as "Rail" above.

Air: 1972-1971 - Preliminary release same source as prior years. 1970-1967 - "Handbook of Airline Statistics", CAB (1971); Coach Revenue, Table 80, p.88; First Class Revenue, Table 77, p.85; Total Revenue, Table 73, p.81.

Consumer Price Index: 1972-1971 - "Economic Indicators" (July 1973), p.26. 1970-1967 - "Economic Report of the President" (January 1973), Table C-44, p.246.

INTERCITY FREIGHT BY MODES (Including Mail and Express)
(Page 6)

Rail, Truck, and Oil Pipe line: 1972-TAA preliminary estimate. 1971-Preliminary release same source as prior years. 1970-"Transport Economics", ICC (Sep.-Oct. 1971), p.4. 1969-1967 - "86th Annual Report", ICC (1970), p.77 and equivalent table in prior year reports. 1966-1959 - "Transport Economics", ICC (Nov.-Dec. 1967), p.5. 1958-1939 - "Intercity Ton-Miles, 1939-1959", ICC (April 1961), p.6.

Great Lakes and Rivers & Canals: 1972 - TAA preliminary estimate. 1971-1968 - "Waterborne Commerce of the U.S.", Corps of Engineers (1971), Part 5, p 33 and 123 and equivalent tables in prior year reports. 1949-1939 - "Waterborne Commerce of the U.S.", Corps of Engineers (1954), Part 5, p.24-25

Note: Separate ton-miles are shown for the Great Lakes, Rivers & Canals, and Domestic Deep Sea traffic because the Corps of Engineers uses [illegible] the traffic in each category. For the years 1970-1961, an attempt has been made to exclude duplication which existed in previous figures. For example, in 1963, the 310 billion ton-miles of Domestic Deep Sea commerce shown in parenthesis in the separate table is the total of the reported 244 billion Domestic Deep Sea ton-miles plus that part of the ton-miles moving on the Great Lakes and on the Rivers & Canals in oceangoing vessels as a portion of a domestic deep sea movement. By deducting the later traffic from the totals of traffic in the Great Lakes and Rivers & Canals categories, we arrive at the 68 billion and the 94 billion ton-miles figures shown in parenthesis, which represent the traffic which was confined solely to each of the waterway categories. The higher Great Lakes and Rivers & Canals figures of 95 and 139 billion ton-miles, respectively, represent the total domestic waterborne traffic moved over each category, regardless of whether it was part of a domestic offshore movement. The total domestic waterborne traffic for 1963 was 4[illegible] billion ton-miles and can be determined by [illegible] figures in parenthesis or the [illegible] of the three figures not in parenthesis. See "Waterborne Commerce of the U.S., 1964", Corps of Engineers, Supplement 2 to Part 5, p. 6-7, and Part 5.

Air: 1972-1971 TAA preliminary estimate. 1970-1939 - "Handbook of Airline Statistics", CAB (1971); sum of columns 3 and 17, Table 27, p.35 plus column 3 of Table 40, p.48, plus column 3 of Table 43, p.51.

INTERCITY FREIGHT FEDERALLY REGULATED
(Percent of Total Ton-Miles Per Mode)
(Page 9)

This table is designed to show the percent of the total freight ton-miles *(including mail and express) of each mode of* transport that are federally regulated by such agencies as the Interstate Commerce Commision and the Civil Aeronautics Board. Figures have been shown only by the years in which firm information has been made available by the regulatory bodies. The percentages are based on the ton-miles for each mode shown in "Transportation Facts & Trends", Tenth Edition, page 8. Sources for the regulated ton-miles each mode are:

Rail: All years-Same sources as for "Rail", page 8. All intercity rail traffic is subject to regulation by the ICC.

Trucks: 1972-TAA estimate 1971 - Advance release same source as earlier years. 1970 - 1962 - "86th Annual Report", ICC (1972), p. 133 table titled "Federally regulated and total intercity ton-miles, 1970", and equivalent table in prior year reports. 1961-1939 - "American Trucking Trends", ATA (1965), p. 7.

Oil Pipeline: 1972-1962 - Same source as for "Truck" above. 1956-1955 - "Transport Economics", ICC (March 1958), p. 11.

Water: All modes - 1971-1962 - "Waterborne Commerce of the U.S.", Corps of Engineers (1971), Part 5, Sec. 3, Table 2, p. 123 and equivalent table in prior years' reports.

Air: All years - Same sources as for "Air", page 8. All commercial intercity air cargo traffic is subject to regulation by the CAB.

Total: All years - consists of the total ton-miles shown in the total column on Page 8 plus the ton-miles (non-parenthetical) shown at the bottom of Page 8 for "Domestic Deep Sea".

INTERCITY TONNAGE CARRIED BY MODE
(Millions of Tons)
(Page 10)

Source Data

Rail: All Years - Class I and II revenue Tons Originated, "Transport Statistics in the U.S.". ICC (1971), Table 155, p.65, and equivalent table in prior year reports.

SOURCE: TRANSPORTATION FACTS & TRENDS, OCTOBER 1973

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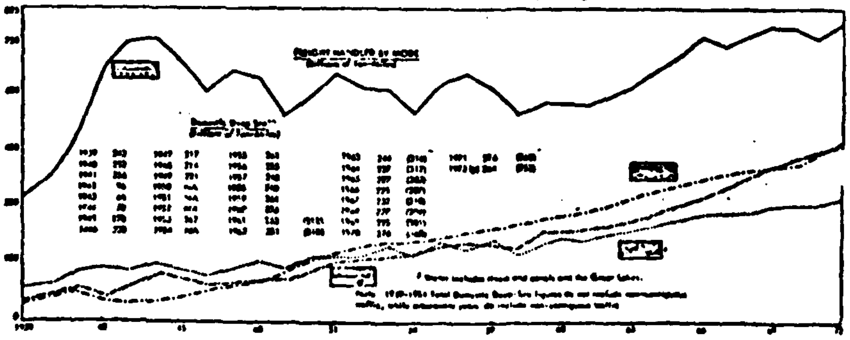
INTERCITY FREIGHT BY MODES* (Including Mail & Express)
(Billions of Ton-Miles)

	Rail Amount	%	Truck Amount	%	Oil Pipeline Amount	%	Great Lakes Amount**	%	Rivers and Canals Amount**	%	Air Amount	%	Total
1939	339	62.3	53	9.7	56	10.3	76	14.0	20	3.7	.01	00	544
1940	379	61.3	62	10.0	59	9.5	96	15.5	22	3.6	.02	00	618
1941	482	62.4	81	10.5	68	8.8	114	14.8	27	3.5	.02	00	772
1942	645	69.5	60	6.5	75	8.1	122	13.1	26	2.8	.04	00	928
1943	735	71.3	57	5.5	98	9.5	115	11.2	26	2.5	.05	00	1,031
1944	747	68.7	58	5.3	133	12.2	119	10.9	31	2.8	.07	.01	1,088
1945	691	67.2	67	6.5	127	12.4	113	11.0	30	2.9	.09	.01	1,028
1946	602	66.6	82	9.1	96	10.6	96	10.6	28	3.1	.08	.01	904
1947	665	65.3	102	10.0	105	10.3	112	11.0	35	3.4	.11	.01	1,019
1948	647	61.9	116	11.1	120	11.5	119	11.4	43	4.1	.15	.01	1,045
1949	535	58.3	127	13.8	115	12.5	98	10.7	42	4.6	.20	.02	917
1950	597	56.2	173	16.3	129	12.1	112	10.5	52	4.9	.30	.03	1,063
1951	655	55.6	188	16.0	152	12.9	120	10.2	62	5.3	.34	.03	1,177
1952	623	54.4	195	17.0	158	13.8	105	9.2	64	5.6	.34	.03	1,145
1953	614	51.0	217	18.0	170	14.1	127	10.6	75	6.2	.37	.03	1,203
1954	557	49.6	213	19.0	179	15.9	91	8.1	83	7.4	.38	.03	1,123
1955	631	49.5	223	17.5	203	15.9	119	9.3	98	7.7	.49	.04	1,274
1956	656	48.4	249	18.4	230	17.0	111	8.2	109	8.0	.58	.04	1,356
1957	626	46.9	254	19.0	223	16.7	117	8.8	115	8.6	.68	.05	1,336
1958	559	46.0	256	21.1	211	17.4	80	6.6	109	9.0	.70	.05	1,216
1959	582	45.3	279	21.7	227	17.7	80	6.2	117	9.1	.80	.06	1,286
1960	579	44.1	285	21.8	229	17.4	99	7.5	121	9.2	.89	.07	1,314
1961	570	43.5	296	22.7	233	17.8	87(67)	6.6	123(84)	9.4	1.01	.08	1,310
1962	600	43.8	309	22.5	238	17.3	90(66)	6.6	133(90)	9.7	1.30	.09	1,371
1963	629	43.3	336	23.1	253	17.4	95(68)	6.5	139(94)	9.6	1.30	.09	1,453
1964	666	43.2	356	23.1	269	17.4	106(73)	6.9	144(102)	9.3	1.50	.10	1,543
1965	709	43.3	359	21.9	306	18.7	110(76)	6.7	152(110)	9.3	1.91	.12	1,638
1966	751	43.0	381	21.8	333	19.1	116(81)	6.6	164(117)	9.4	2.25	.13	1,747
1967	731	41.4	389	22.0	361	20.5	107(75)	6.1	174(128)	9.9	2.59	.15	1,765
1968	757	41.2	396	21.5	391	21.3	112(75)	6.1	179(139)	9.7	2.90	.16	1,838
1969	774#	40.8	404	21.3	411	21.7	115(83)	6.1	188(144)	9.9	3.20	.17	1,895
1970	771	39.7	412	21.3	431	22.3	114(79)	5.9	205(156)	10.6	3.40	.18	1,936
1971	746	38.2	445	22.8	444	22.7	105(70)	5.4	210(161)	10.7	3.50	.18	1,954
1972 (p)	785	38.2	470	22.9	457	22.2	109(73)	5.3	230(178)	11.2	3.80	.18	2,055

* Includes both for-hire and private carriers. #Effective 1969 no longer includes mail and express. (p) TAA preliminary estimate
** See source data for figures in parenthesis, which are based on different reporting techniques.



8 see source data page A-

SOURCE: TRANSPORTATION FACTS & TRENDS, OCTOBER 1973

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BARGE MILES vs. RAIL MILES

Origin/Destination	Movement No.	Miles BARGE (Actual)	Miles RAIL (Logical Route)	Route Assumed In Computing Logical Route Miles
GUTTENBERG, IA. TO				
Beaumont, Tex.	1	1,604	1,179	CMSP&P-Dubuque-BN-St.Louis-MP-Texarkana-KCS
Houston, Tex.	2	1,711	1,140	CMSP&P-Dubuque-BN-St.Louis-MP
Galveston, Tex.	3	1,663	1,196	CMSP&P-Dubuque-BN-St.Louis-MP-Houston-GH&H
New Orleans, La.	4	1,481	1,144	CMSP&P-Dubuque-BN-St.Louis-SLSF-Memphis-ICG
Baton Rouge, La.	5	1,340	1,095	CMSP&P-Dubuque-BN-St.Louis-SLSF-Memphis-ICG
Memphis, Tenn.	6	844	728	CMSP&P-Dubuque-BN-St.Louis-SLSF
Vicksburg, Miss.	7	1,132	949	CMSP&P-Dubuque-BN-St.Louis-SLSF-Memphis-ICG
St.Louis, Mo.	8	435	423	CMSP&P-Dubuque-BN-St.Louis
Hannibal, Mo.	9	401	310	CMSP&P-Dubuque-BN
Burlington, Ia.	10	211	218	CMSP&P-Dubuque-BN
Kansas City, Mo.	11	801	459	CMSP&P-Dubuque-BN-Fort Madison-ATSF
S. Total		11,623	8,841	
DUBUQUE, IA. TO				
Beaumont, Tex.	12	1,568	1,145	BN-St.Louis-MP-Texarkana-KCS
Houston, Tex.	13	1,675	1,106	BN-St.Louis-MP
Galveston, Tex.	14	1,627	1,162	BN-St.Louis-MP-Houston-GH&H
New Orleans, La.	15	1,445	1,113	BN-St.Louis-SLSF-Memphis-ICG
Baton Rouge, La.	16	1,304	1,064	BN-St.Louis-SLSF-Memphis-ICG
Memphis, Tenn.	17	808	694	BN-St.Louis-SLSF-Memphis
Vicksburg, Miss.	18	1,096	915	BN-St.Louis-SLSF-Memphis-ICG
St.Louis, Mo.	19	399	389	BN-Direct
Hannibal, Mo.	20	365	278	BN-Direct
Burlington, Ia.	21	175	187	BN-Direct
Kansas City, Mo.	22	765	425	BN-Fort Madison-ATSF
S. Total		11,227	5,478	
LACROSSE, WIS. TO				
Beaumont, Tex.	23	1,688	1,259	BN-St.Louis-MP-Texarkana-KCS
Houston, Tex.	24	1,795	1,220	BN-St.Louis-MP
Galveston, Tex.	25	1,447	1,276	BN-St.Louis-MP-Houston-GH&H
New Orleans, La.	26	1,565	1,227	BN-St.Louis-SLSF-Memphis-ICG
Baton Rouge, La.	27	1,424	1,178	BN-St.Louis-SLSF-Memphis-ICG
Memphis, Tenn.	28	928	808	BN-St.Louis-SLSF
Vicksburg, Miss.	29	1,216	1,099	BN-St.Louis-SLSF-Memphis-ICG
St.Louis, Mo.	30	516	503	BN-Direct
Hannibal, Mo.	31	390	392	BN-Direct
Burlington, Ia.	32	295	301	BN-Direct
Kansas City, Mo.	33	985	539	CMSP&P-Direct
S. Total		12,149	9,502	
WINONA, MINN. TO				
Beaumont, Tex.	34	1,714	1,286	BN-St.Louis-MP-Texarkana-KCS
Houston, Tex.	35	1,821	1,247	BN-St.Louis-MP
Galveston, Tex.	36	1,773	1,303	BN-St.Louis-MP-Houston-GH&H
New Orleans, La.	37	1,591	1,257	BN-St.Louis-SLSF-Memphis-ICG
Baton Rouge, La.	38	1,450	1,197	BN-St.Louis-SLSF-Memphis-ICG
Memphis, Tenn.	39	957	835	BN-St.Louis-SLSF
Vicksburg, Miss.	40	1,242	1,056	BN-St.Louis-SLSF-Memphis-ICG
St. Louis, Mo.	41	542	530	BN-Direct
Hannibal, Mo.	42	416	419	BN-Direct
Burlington, Ia.	43	321	328	BN-Direct
Kansas City, Mo.	44	911	585	CMSP&P-Direct
S. Total		12,738	10,043	
ST.PAUL, MINN. TO				
Beaumont, Tex.	45	1,828	1,344	CRI&P-St.Louis-MP-Texarkana-KCS
Houston, Tex.	46	1,915	1,342	CRI&P-St.Louis-MP
Galveston, Tex.	47	1,887	1,398	CRI&P-St.Louis-MP-Houston-GH&H
New Orleans, La.	48	1,705	1,286	CRI&P-St.Louis-SLSF-Memphis-ICG
Baton Rouge, La.	49	1,564	1,337	CRI&P-St.Louis-SLSF-Memphis-ICG
Memphis, Tenn.	50	1,068	870	CRI&P-St.Louis-SLSF
Vicksburg, Miss.	51	1,356	1,091	CRI&P-St.Louis-SLSF-Memphis-ICG
St. Louis, Mo.	52	659	565	CRI&P-Direct
Hannibal, Mo.	53	530	514	BN-Direct
Burlington, Ia.	54	435	423	BN-Direct
Kansas City, Mo.	55	1,025	474	CRI&P-Direct
S. Total		13,972	10,644	
GRAND TOTAL		61,709	47,808	
Barge Over Rail Circuity -		29.1%		

Traffic Research - MoPac R.R.
St.Louis,Mo. 3/26/74 MLS

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 270

NSP

NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

April 4, 1974

Col Rodney E Cox, District Engineer
St Paul District, Corps of Engineers
1210 U S Post Office and Custom House
St Paul, Minnesota 55101

DRAFT ENVIRONMENTAL IMPACT STATEMENT
Operation and Maintenance, 9-Foot Navigation Channel
Upper Mississippi River, Head of Navigation to Guttenberg, Iowa

We have reviewed the subject Draft Environmental Impact Statement and offer the following comments:

Page 198, Paragraph 2, Item 2, under the heading "Commodity, Origin, and Destination", the origin of the coal should read "East St Louis, Kellogg, Ohio & Green River Docks".

Page 209, Paragraph 3, entitled "Waterborne Commerce", the third sentence should read, "In 1971, 1,193,062 tons of bituminous coal . . . ." instead of "lignite".

Page 274, You may wish to consider the following for inclusion in the first paragraph - "In the case of coal, railroads are normally involved in the transportation from mines to loading docks where high utilization of equipment is attained due to single line control of cars."

Should you have any questions, please contact this office.

G V WELK, Director
Regulatory Activities

lmj

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 271

LETTER OF COMMENT
NORTHERN STATES POWER COMPANY

NORTH STAR RESEARCH AND DEVELOPMENT INSTITUTE
3100 THIRTY-EIGHTH AVENUE SOUTH • MINNEAPOLIS, MINNESOTA 55406
TELEPHONE (612) 721-8373

May 6, 1974

Colonel Rodney E. Cox
District Engineer
U. S. Army Corps of Engineers
St. Paul District
1210 U. S. Post Office and Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

We appreciate the opportunity to review the Draft Environmental Impact Statement on the 9-foot navigation channel, and would like to make the following comments. 1) Paragraph 2 on page 279 begins with a statement that the source of the previous paragraph was North Star Research Institute's environmental impact assessment reports. We believe that this is true for only the first part of the paragraph, that is, from its beginning on page 278 to the phrase "...or move through the St. Paul District pools on river barges." The text material which follows is not, as far as we can determine, in our reports. If it was, indeed, in one of our 14 reports, please inform us as to the pool report and page number. If it was not, we suggest it either be deleted or be moved below the reference to North Star's authorship.

2) We feel that it would be appropriate to reference sources of many statements, research and other materials.

3) We regret the absence in the exhibits of most of the data on benthic macroinvertebrates, which we consider to be very important to the determination of impacts.

We hope these comments will be helpful to you in preparing your final statement.

Sincerely,

E. E. Erickson
by m.w.

E. E. Erickson
Director
Environmental Systems Division

EEE/mw

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 272

LETTER OF COMMENT
NORTH STAR RESEARCH AND DEVELOPMENT INSTITUTE

PHONE 427-4373
AREA CODE 312

SAHARA COAL COMPANY, Inc.

59 EAST VAN BUREN STREET
CHICAGO, ILLINOIS
60605

March 27, 1974

District Engineer
St. Paul District Corps of Engineers
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Sir:

We have your letter and draft of Environmental Impact Statement for Operation and Maintenance of the 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa.

We have no objection to this and would like our comments incorporated into the final statement.

Yours very truly,

Harry Eggert

Harry Eggert
Sales Manager

HE:dp

CORPS OF ENGINEERS
ST. PAUL DISTRICT

EXHIBIT 273

LETTER OF COMMENT
SAHARA COAL COMPANY, INC.

st. paul ammonia products, inc. . . . . ST. PAUL MINNESOTA . . .

April 1, 1974

District Engineer
St. Paul District Corps of Engineers
1210 U. S. Post Office & Custom House
Saint Paul, Minnesota 55101

Dear Sir:

Please reference the U. S. Corps of Engineers proposed Environmental Impact Statement concerning the operation and maintenance of a nine foot navigational channel on the Upper Mississippi River.

St. Paul Ammonia Products, Inc. is a manufacturer and distributor of nitrogen fertilizers in the Upper Midwest area. We operate a 2500 ton anhydrous ammonia barge carrying product from our anhydrous ammonia production plant in East Dubuque, Illinois to our manufacturing plant at Pine Bend, Minnesota. During the 1973 navigational season we moved a total of 70,000 tons to Pine Bend. Projections for 1974 are similar.

The extreme shortage of nitrogen fertilizers makes it imperative that we operate our manufacturing facilities at full capacity. The movement of quantity tonnages to our Pine Bend facility is economically feasible by barge, and the maintenance of the nine foot channel will allow us to continue our present operation. Many farmers in Minnesota, Wisconsin, North and South Dakota, Illinois and Iowa are dependent upon us as their suppliers and the economic hardships that would result from a ban on dredging would be immeasurable.

Thank you.

Sincerely,

ST. PAUL AMMONIA PRODUCTS, INC.

Jack Hanson,
Traffic Manager

JHH/lec

MANUFACTURING FACILITY AND TERMINAL DRAWER D EAST DUBUQUE ILLINOIS 61025 (815) 742 3101 TWX 910 642 3790

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 274

LETTER OF COMMENT
ST. PAUL AMMONIA PRODUCTS, INC.

TANK BARGES – HARBOR SWITCHING –
FLEETING – BOAT STORES

Twin City Barge & Towing Company

1303 RED ROCK ROAD – P.O. BOX 3032 – ST. PAUL, MINN. 55165

TELEPHONE
ST. PAUL 612 735 5440

April 5, 1974

Colonel Rodney E. Cox
Department of the Army
St. Paul District Corps of Engineers
1210 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Cox:

This letter contains comments on various facts and aspects contained in the draft Environmental Impact Statement concerning operation and maintenance of the 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg, Iowa, dated February 1974.

Several stated facts or assumptions contained in the EIS are patently incorrect:

1. Page 178 notes "pollution from barge spillage and cleaning" as problems. Barge cleaning is performed at plants licensed by the Minnesota Pollution Control Agency and they permit no pollution of the river.

2. Page 273 further discusses that adverse aspect of towing operations, whereby barges are tied off to trees. Any careful analysis of fleeting or terminal operations would show that this practice has disappeared almost entirely. It is not permitted by the Corps of Engineers and almost every fleet in the St. Paul District now uses or is being converted to anchors or driven pile moorings.

3. Page 333 takes notes of the increasing probability of spills from barge transporation. Curiously, no facts or supporting evidence are offered to support this claim. Nor do statistics available from the U. S. Coast Guard support such a conclusion. Quite the contrary, the advent of double skin barges and improved methods and operating procedures have reduced barge spill accidents to insignificant levels.

4. Commencing on or about Page 442 and later on Page 483 a major case is made for the economic value of dredge spoil for commercial "aggregate" uses. This assumption is completely false and is contrary to basic technical and economic factors pertaining to the aggregate business.

5. Discussions on Page 385 and the statistics contained in Exhibit 192 would seem to make a case for removing dredge spoil from the floodplain for upland disposition. Based on the distance material would have to be hauled, and in the light of current rail car shortages, the 412 cars per day estimate for the 6-month operation would involve a staggering percentage of the gondola car fleet available in this region.

6. On Page 326 it is indicated that based on present waterborne commerce growth rates traffic in the St. Paul District will double from 1964 to 1980. In fact at the present rate traffic will double by about 1976 or 1977 and will triple well in advance of the year 2000.

The EIS attempts to focus on the villainous role that operation and maintenance of the 9-foot channel plays in distrubing the natural environment of the river. Yet its findings are such that sedimentation appears to be the main trouble-maker and the 9-foot channel a misunderstood hero with a mixed bag of blessings.

1. Page 292: It is stated that the 9-foot pools by their maintenance and operation created greater rates of sedimentation, but also created greater water surface areas than would be the case without the Project. It is further noted that urban growth in terms of transportation, manufacturing, processing, commerce, housing, and recreation developed so as to utilize the resources provided by the existing Project.

2. Page 295 notes: "The degree to which maintenance spoil contributes to this problem (sedimentation) is not entirely clear as of the time of this report."

   Further it notes: "The very large quantities of material moving purely as a result of natural forces." And finally: "The existing hydrological system is actually becoming more stable."

3. Page 297: "Operations associated with the dams have caused few adverse effects to the natural environment since the Anti-Drawdown Law became effective in 1948."

4. Page 305: "It is not possible to accurately determine, on an acreage basis, the extent of river habitat affected by any one influence, such as disposal of maintenance dredge spoil. The situation is complicated by natural erosion and sedimentation, by cultural influences such as land use in the contributing watershed, and by floodplain construction for bridges, etc."

5. Page 313: "The maintenance of a relatively stable water surface elevation in the middle pool enhances the variety of diversity of aquatic vegetation and this is of great benefit to many of the more prominent and appreciated forms of aquatic life."

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 275

6. Page 324: "It is noted that the disposal of dredge spoil as well as natural erosion and sedimentation are responsible for the blockage and filling of backwater areas."

7. Page 331 - 332 makes the point that while fish, wildlife, and recreation interests blame spoil deposits for re-circulation and depositing in backwater sloughs and feeder channels, "this isolation, however, is attributed to the natural movement of sediments and various kinds of floodplain construction, such as bridges and roads, as well as to the placement and secondary movement of maintenance dredge spoil."

The study begins to zero in on the sedimentation matter which it characterizes as the primary cause of the difficulty as well as the principal dilemma:

1. Page 341: "If there was a decrease in the amount of bedload reaching the main channel of the Mississippi River, maintenance dredging and its attendant adverse impacts would eventually be reduced."

2. Page 345: "It was estimated that preventing erosion of the sand and gravel terraces along the lower Chippewa River might eventually reduce dredging in pools 4 (below Lake Pepin), 5, and 5A, by an average of 35 percent."

3. Page 346: "Also, trying to institute more watershed land treatment measures in an emerging era of food shortages, which encourages cultivation of every acre possible, would probably be difficult."

4. Page 357 notes that congressional authority exists for construction of confined disposal areas.

The EIS, having identified the cause and effect, then attempts to focus on the solution--planned specific spoil placement:

1. Page 371: "The greatest potential for reduction of adverse impacts through placement techniques lies primarily in the specific location of spoil placement.

2. Page 372: "Planned disposal of dredge material in a designated area might provide a technique to alleviate some adverse environmental impacts."

3. Page 375: "Selective placement of material could provide the potential for more compatible uses of the sand as part of the productive and valuable river environment."

But having found a possible solution, the EIS founders on both the real worth of specific placement or removal and the method of executing this plan:

1. Page 377: The use of present dredge plant with extension of pipe lines and booster points to remote disposal sites could cause additional disruptions to the river ecosystems, especially in the remote areas from the main channel which would not normally receive such impacts. Remote disposal would require a major acquisition of additional dredging equipment.

2. Page 382: "There are conceivably many areas in the uplands within a 50-mile radius of the river where the material could be placed; however, actual suitable or desirable sites have not been located or determined."

3. Page 383: First states that the removal of dredge material out of the floodplain "could" be important.

Hence, we come to the other side of the coin.

If indeed we resolve the serious problems it is alleged that dredge spoil causes, then we create another potential quandry. Where do we relocate the problem and at what cost?

1. Page 386: "The actual desirability of removing the material from the floodplain must be based on the selection of final disposal and utilization sites and the comparison of the net gains and losses involved. Only in those non-floodplain areas which have a high demand and place a relatively high value on this material would there be a potentially practical reason for implementing this alternative."

2. Page 448: "In most cases, the amount an individual community or company would be willing to pay for the dredged spoil would probably not even come close to the extra cost that would be involved in providing it."

3. Page 457: "The alternative measures selected for inclusion in the alternative plans are not to be considered as the only nor the best alternatives which will alleviate adverse impacts of the existing operations and maintenance activities."

   "Although these plans may reduce present adverse impacts, several plans may actually create other adverse impacts which would completely offset any potential gains of the plan."

4. Page 465: "These alternative measures were selected based only on their potential for alleviation of adverse impacts and are not recommended for implementation. Often the added cost of implementing the measures could far exceed any benefit to be gained."

   "Although several of these alternative plans may seem out of line and obviously unreasonable to many individuals, they are presented as objectively as possible so that each alternative may be judged on its own merits and conclusions concerning the alternative plans may be reached on an individual basis."

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 275

The summary of alternatives discussed, beginning on Page 573, range from the status quo to the extreme of removing dredge spoil from the floodplain. The costs involved range from the present $740,000 or 50¢ per cubic yard annually to $8,120,000 or a $5.40 per cubic yard annually.

The EIS is in essence, and by its own admission, a study in forensics:

> Page 576: "The reasonability of implementing any of these plans was not used as a qualification for their evaluation, but rather their evaluation should offer the specific information necessary to judge the relative merits of each plan."

It addresses problems which are essentially unsolvable like death, taxes, and the weather. Only the degree of treatment may be addressed, and this must be weighed by Congress in the light of the many and sometimes divergent demands on the use of public waters.

Fiscal responsibility and the need to balance essential needs for the public good dictate a moderate posture far from the extreme and so far unsupported claims of environmentalists and conservationists.

It is interesting to observe that some of the same conservation groups which are demanding extreme alternatives today predicated disaster in the 1930's, if the 9-Foot Project were to be approved. Based on the findings contained in the EIS concerning the value of the Project to the natural environment, it seems obvious that the conservationists were wrong. Since an environmental agency precipitated this Study, it is apparent that they are still afflicted with the same narrow viewpoint that characterized their predecessors.

The Federal Government enacted the National Environmental Policy Act in order to give it a balanced view of the environment in relation to other essential activities. The facts contained in this EIS certainly do not support any extreme alternative to the status quo.

Sincerely,

TWIN CITY BARGE & TOWING COMPANY

John W. Lambert

John W. Lambert
President

mas

EXECUTIVE COMMITTEE
WESTERN RAILROAD TRAFFIC ASSOCIATION

ROOM 1200 • 222 SOUTH RIVERSIDE PLAZA
CHICAGO, ILLINOIS 60606

GEORGE E. ANDERSON
WATER RESOURCES ANALYST

TELEPHONE (312) 648 7816
648-7812

May 6, 1974

Col. Rodney E. Cox
St. Paul District Engineer
U.S. Army Corps of Engineers
1210 U.S. Post Office & Custom House
St. Paul, Minnesota

Dear Col. Cox:

This is a reply to your form letter of February 21, 1974 to the Western Railroad Association enclosing, for public comment, the St. Paul District's two-volume February, 1974 Draft Environmental Impact Statement report (on Operation and Maintenance, 9-foot Navigation Channel Upper Mississippi River, Head of Navigation to Guttenberg, Iowa) which was prepared in response to section 102(2)(c) of the National Environmental Policy Act of 1969 (Public Law 91-190).

<u>Deadline for Submission of Comments to Be Incorporated Into the Final Statement</u>

Your letter of February 21, 1974 stated: "Comments on this draft environmental impact statement will be accepted for 45 days after the date of circulation" and "Therefore, if you wish your comments incorporated into the final statement, please reply by 8 April 1974." This deadline is not consistent with C.E.Q. (Council on Environmental Quality) guidelines for draft environmental impact statements which provides a minimum 45 day period for public review and comment from the date of the FEDERAL REGISTER notice of availability. The C.E.Q. notice of availability of the draft E.I.S. for the Upper Mississippi River Navigation channel appeared on page 10932 of the FEDERAL REGISTER for Friday, March 22, 1974 and states the minimum period for public review extends through May 6, 1974.

<u>Incorrect and Misleading Portions of the Draft E.I.S. Could Influence Subsequent Navigation Improvement Decisions</u>

While the Western Railroads have taken no official position at this time regarding the continuation of Federal operation and maintenance funding for the Upper Mississippi River 9-foot navigation project, they have taken a strong position, through the EC-WRTA, against proposals to greatly improve and extend the commercial navigation facilities in the Upper Mississippi River basin region. As indicated in Table J-32 on page J-111 in Appendix J of the Upper Mississippi River Comprehensive Basin Study dated 1970, those proposed improvements which the Corps indicates will be needed by the year 2000 would cost $3.2 billion. This amounts to an average expenditure of one million dollars every three days during the next 27 years. The comments presented in this letter have been prepared and submitted in response to the concern that incorrect and misleading information in the draft E.I.S. report, if unchallenged, could influence future inland waterway decisions.

Extensive Navigation Improvements Would Have A Serious Adverse Effect on the Railroad Industry and Would Not Represent Efficient Use and Conservation of Our Nation's Resources

The extensive commercial navigation improvements being proposed in the Upper Mississippi River Basin would result in a serious diversion of traffic and much needed income from the railroad industry. As an example, the proposal to replace or duplicate the locks at 18 to 32 existing lock locations on the Upper Mississippi River and Illinois Waterway at a current estimated cost of 1.7 to 2.2 billion dollars would, according to the Corps, increase the annual waterway traffic tonnage in the Upper Mississippi River Basin from the current level of about 65 million tons to an estimated level of about 220 million tons during the next 50 years. Most of this traffic in the absence of the lock replacement or duplication improvements would move by rail. Also, the estimated rate savings to the potential waterway shippers would represent little more than a diversion of potential net income from the railroads.

The Draft E.I.S. Gives A Very Distorted Modal Transportation Efficiency Comparison

On pages xi, 177 and 278 of the draft E.I.S., the statement is made that navigation on the Upper Mississippi River results in savings in transportation costs for bulk commodities of between 4.0 and 5.4 mills per ton-mile over the least-cost alternative mode of transportation. These statements are incorrect to the extent that wherever the word "cost" appears, it should be replaced by the word "rate." The reference for these rate savings estimates is page J-90 in Appendix J of the 1970 Upper Mississippi River Comprehensive Basin Study. On page J-90 it is clearly indicated that these values of 4.0 to 5.4 mills per ton-mile were based on rate analyses developed for the Corps by Charles Donley and Associates, Pittsburgh, Pennsylvania.

No modal efficiency or transportation cost comparison has been made by the Corps for any portion of the Upper Mississippi River-Illinois Waterway system. Also, apparently on only one occasion did the Corps ever make a transportation cost comparison in addition to a transportation rate comparison when evaluating the economic justification for any inland navigation project. This one occasion was in connection with the Pittsburgh District Engineer's April 1965 report on economic re-evaluation of the proposed 120 mile, one billion dollar Lake Erie-Ohio River canal project. The modal transportation rate and cost comparison study by Arthur D. Little for the Pittsburgh District Engineer revealed that for the movement of dry bulk cargo, which would constitute 97% of the initial prospective canal traffic, the transportation cost by rail was less than by barge. A total of 92.7% of the transportation rate savings to the prospective waterway shippers would merely represent a transfer of net income from existing rail carriers with no economic benefit or savings in transportation cost to the nation.

A copy of my letter of April 29, 1974 to the St. Louis District of the Corps submitting comments on the draft E.I.S. for replacement of Locks and Dam No. 26 is enclosed and is to be considered as part of these comments. Page 20 of the April 29 letter explains why the rate saving value of 5.4 mills per ton-mile is incorrect. For the five commodity groups where the railroads are the primary alternative mode of transportation, the average rate savings is only about 3.8 mills per ton-mile. On pages 18 and 19 of the April 29 letter, it is indicated that waterway shippers in shipping by barge rather than by rail should automatically save about 4 mills per ton-mile merely by not having to contribute (through rail freight rate charges) to the railroad right-of-way costs and taxes.

The fact that the actual rate savings to the waterway shippers is even less than the average amount which they should save by merely not having to contribute to the railroad right-of way costs and taxes through rail freight charges supports the railroads' contention that, actually, there are little or no net benefits. About all that the waterway accomplishes is to provide a shift in net income from the railroads to the waterway shippers and barge lines. Based on the A. D. Little transportation cost comparison for the Lake Erie-Ohio River canal, the increase in net income to the waterway shippers and barge lines is even less than the loss of net income to the railroads. In view of this situation, it would make more economic sense for the Federal Government to pay a direct subsidy (to the potential waterway shippers if they were to ship by rail) rather than build, operate and maintain an expensive inland waterway project to merely accomplish the same net result. As explained in the April 29 letter, this would also provide a better deal to all other rail shippers who are not in a position to ship by water.

The Draft E.I.S. Gives A Very Distorted Picture Regarding the Extent to Which the Existing Railroad System Could Handle Additional Traffic

The following statement appears in the final (November, 1973) Environmental Impact Assessment Study report on the Upper Mississippi River prepared by the North Star Research Institute for the St. Paul District under contract No. DACW37-73-C-0059:

> "...the importance of the Upper Mississippi River as a transportation artery is shown by the burden which would be placed on the rail system (as the major alternative transportation mode used to move heavy, high-bulk commodities) in the absence of barge traffic on the river. In 1972 an estimated 16,361,174 tons of various commodities were received and shipped from the St. Paul District. Under the simplifying assumption that the average box or hopper car carries 50 tons, this amounts to the equivalent of 327,223 railroad cars, or some 3272 trains of 100 cars each, or approximately nine trains each day of the year."

A somewhat similar concern as to the adequacy of the railroads to handle additional traffic is presented on page 280 of the draft E.I.S. and represents a quotation from a December 17, 1973 letter from the Interstate Power Co.:

> "When you consider the problem of alternate forms of transportation, a volume of this size [1,800,000 tons of coal each year] would require 13,000 rail car loads (70 ton cars) each year or 50 cars each working day for present requirements and for the 1977 requirements, 25,000 rail car loads per year or 95 cars each working day." [Material in brackets has been added.]

Both of these statements present a distorted picture as to the number of rail cars required since almost all of the Upper Mississippi River traffic involves grain or coal. For high volume movements of coal and grain, the railroads use unit trains consisting usually of 100 cars. Almost without exception, the hopper car capacity for unit trains is 100 net tons and the total net tons per train is usually 10,000 tons.

In order to substantiate the fact that with the existing rail trackage and associated structures, the railroads could easily move the number of trains required for all of the existing <u>and</u>

prospective waterway traffic in the Upper Mississippi River Basin, I quote the following from the presentation by Mr. T. Michael Power, Manager-Special Projects, Marketing Services, Burlington Northern Inc., during the panel discussion on "Some Alternatives to Waterway Navigation" at the 29th Annual Meeting of the Upper Mississippi River Conservation Committee, January 9-10, 1973, Leamington Hotel, Minneapolis, Minnesota:

> "But what is the freight carrying capacity of the railroads? How much freight can be moved in a day?
>
> A double track railroad with a safe headway of ten minutes per train, can move 144 trains one way or 288 trains both ways in 24 hours. If they were all 10,000 ton commodity trains, at this rate, in only 18 days they could move all the tonnage barges transport on the Upper Mississippi River in a year. A single track railroad with modern signaling can safely move from 48 to 72 trains per day both ways. A modern stretch of any line of any American railroad thus has a fantastic freight carrying capacity, but the capacity of the railroads in the five states you gentlement represent is above tne national average, because this region with 10.6% of the continental United States' land area has 19% of the nation's railroad track. Probably the greatest concentration of railroads in the world.
>
> What does this trackage and carrying capacity of a railroad mean as an alternative to the inland waterways? In 1971, the Upper Mississippi barge lines moved 52 million tons of various commodities. This amounts to 14 one hundred car trains a day at 10,000 tons each. Most railroads in this area have only 6-14 trains a day over their main lines, and thus there is tremendous excess railroad capacity in the Upper Midwest. Parallel to the Mississippi River between the Twin Cities and St. Louis, for example, there are at least five separate railroad routes. Any one of them alone could handle an extra 14 trains per day to say nothing of dividing the traffic up between all the railroads serving this area."

As to the current actual and future potential traffic carrying capacity of the American railroads, I quote the following from page 27 of the August, 1971 report on "A Study of the Environmental Impact of Projected Increases in Intercity Freight Traffic" by Battelle, Columbus Laboratories:

"In contrast, the traffic-carrying capacity of American railroads, exclusive of terminal facilities, may be two to three times the current rate of utilization. This is based on the results of a study of British railroads.[31] With modernization (particularly of signalling capability), use of longer (heavier) trains, and faster operation, the traffic-carrying capacity of many railroads in the United States might be increased by a factor of seven. Thus, no capacity limitation for railroads, in contrast to highways for trucks, is evident currently or in the foreseeable future."

With refreence to the rail car shortages mentioned on pages 280 and 282 of the Draft E.I.S., these shortages are usually seasonal in nature and of limited duration. Rail car shortages frequently develop during the periods of heavy demand for moving grain. While storage represents an alternative to shipping of grain during the peak grain harvest period, storage, of course, involves additional costs. A good answer to the periodic rail car shortages for moving grain would be the payment of an extra charge for the use of rail cars for moving grain during the grain harvest period. If more grain were put in storage, it would obviously level off the period of high demand for rail cars. There are enough rail cars; the real problem is merely better utilization. The railroads are not free to vary their rates in response to these high demand periods.

The Draft E.I.S. Gives A Very Distorted Energy Consumption and Air Pollution Comparison Between the Rail and Barge Modes

Background information on this subject is presented on pages 22, 23 and 24 of the April 29th letter. A copy of our preliminary discussion on "Energy Consumption Comparison Between Waterway and Railroad Transportation" is enclosed.

In order to present additional information and more fully explain the deficiencies in the Draft E.I.S., I would welcome the opportunity of arranging to meet with the staff of your Environmental Resources Branch.

Sincerely yours,

George E. Anderson

George E. Anderson

GEA/mts
Enclosure

CORPS OF ENGINEERS

ST. PAUL DISTRICT

EXHIBIT 276

ENERGY CONSUMPTION COMPARISON BETWEEN WATERWAY AND RAILROAD TRANSPORTATION

Comparison Based on Average Energy Consumption

Several studies have developed average energy consumption values for the transportation of freight by the various modes. These average values are obtained from information on the total gallons of fuel purchased per year for freight transportation and the total yearly net ton-miles of freight traffic. These values have usually been expressed in terms of Btu/net ton-mile. Gallons per net ton-mile or net ton-miles per gallon have also been used. [The conversion relationship is as follows: gal/NTM x 138,700 Btu/gal = Btu/net ton-mile.] The published average energy consumption values in Btu/net ton-mile are as follows:

STUDY	FUNDED BY	WATERWAY	RAILROAD
a) Dec. 1971 Rand Study by Dr. W.E. Mooz	Nat. Sc. Found.	500	750
Aug. 1973 Correction by Dr. W.E. Mooz	Nat. Sc. Found	512	658
b) March 1972 Oak Ridge by Dr. Eric Hirst	Nat. Sc. Found.	540	680
c) April 1973 Oak Ridge by Dr. Eric Hirst	Nat. Sc. Found	680	670
d) May 1973 D.O.T. Trans. Sys. Center by J.C. Sturm	F R A	595	680
AVERAGE OF FOUR		582	672

Relative Accuracy of the Average Energy Consumption Values

Except for the Dec. 1971 study value by Dr. Mooz, which he has subsequently corrected by letter of Aug. 8, 1973 [but which is still being quoted regularly by the waterway promoters], the average rail energy consumption values are in close agreement (658 to 680 Btu/NTM). On the other hand, the average waterway values vary from 512 to 680 Btu/NTM. As indicated in Dr. Eric Hirst's letter of June 18, 1973: "based on the work done by Mooz and myself, I feel that the EI (energy intensiveness) estimates for rail are fairly accurate but that those for waterway are subject to considerable error."

Relative Significance of a Comparison of Average Energy Consumption Values Between Waterway and Railroad Transportation

In addition to the fact that the average energy consumption values for the waterway mode "are subject to considerable error" there are two even more important reasons why a comparison between these waterway and rail average energy consumption values, particularly the original values by Dr. Mooz, is of limited value and can be quite misleading. None of the modal energy studies to date have considered the difference in circuity between the various modes nor the fact that only that portion of the total railroad freight movement which competes with waterway movements should be compared to the waterway movement.

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Influence of Circuity

There have been many studies of the comparative miles required by different forms of transportation to complete the same movement. One such study[1] compared the short-line route mileages for 40 inland city combinations served by the inland waterway system. This study showed that on the average, inland waterway routes are 49 percent longer than railroad routes between the same pairs of cities. A September 26, 1973 Missouri Pacific Railroad Traffic Research Study of rail miles v. barge miles for 64 inland waterway movements, consisting of 16 origins and 4 destinations, gave a comparison of 59,026 rail miles v. 91,488 barge miles. The barge miles being 55 percent greater than the rail miles.

Since not all of the rail movements move via the shortest rail route, the rail mileage can be increased by a factor to take this into consideration. From the April, 1968 I.C.C. Bureau of Economics report [Statement No. 68-1] on "Circuity of Rail Carload Freight," the average circuity is approximately 15%. Increasing the Missouri Pacific rail mileage value by 15% gives a total rail mileage of 67,880 miles. Even with the correction, the total barge mileage is 34.8 percent greater than the corrected rail miles.

Applying this circuity correction to the average waterway energy consumption value of 582 gives a value of 785 which is 16.8% greater than the average railroad energy consumption value of 672.

Influence of the Non-Waterway Competition Portion of the Total Rail Movement

A meaningful comparison between the energy consumption for the waterway and railroad modes should be based solely on that portion of the total railroad freight movement which competes directly with waterway movements. As an example, the high speed manifest train movements compete directly with the truck mode rather than with the waterway mode. The added motive power and higher speeds for such trains significantly increase the fuel consumption per net ton-mile. Also, most of the rail movements in direct competition with waterway movements are mostly north or south movements which involve little, if any, of the steep grades that exist in an east and west rail movement over the continental divide.

The influence of high speed train and mountain territory operations on average fuel consumption could possibly account for the significant variation in average energy consumption which exists from railroad to railroad. A Missouri Pacific Traffic Research study in 1973 determined the average energy consumption for each of 17 railroads. These values varied from a low of 536 Btu/NTM to a high of 791 Btu/NTM. The railroad which probably has more water competition than any other railroad in the U.S. was found to have the lowest energy consumption value. Also, the railroad which is noted for its high speed freight trains and which crosses the continental divide had the highest energy consumption value.

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[1] Martin, Jerry W., "Comparison of the Great Circle, Airline Route, Highway, and Rail Mileage Between 50 Largest Cities in the United States," Hagerstown: Fairchild Aircraft, 1946.

Much, if not most of the railroads' low traffic density branch-line, spur-line and yard operations, all of which have a relatively high energy consumption rate, should not be included in a comparison with the high tonnage, terminal to terminal waterway movement. The railroads' high tonnage unit train movement of dry bulk commodities, however, clearly corresponds to and competes with high tonnage waterway movements. With one exception, the writer has as yet not had access to energy consumption values for high tonnage unit train movement of dry bulk commodities. The one exception appears on page 10 in section VII of the December, 1972 Burlington Northern Inc. report on "Environmental Analysis of the Railroad Line Construction and Operation Between Douglas and Gillette, Wyoming":

> "Burlington Northern's experience has shown that the railroad locomotives proposed for use on this line will consume approximately 2 gallons of diesel fuel oil per mile when used in unit train service. With five locomotives and 11,000 tons of coal per train, this yields 0.0009 gallons per ton-mile. Doubling this quantity to allow for fuel consumed in returning the empty train to the mine, and applying a factor of 6 million Btu's of energy per barrel (42 gallons) of fuel oil yields an approximate consumption of 250 Btu per ton mile."

[Alternate calculation method:

$$\frac{2 \times 5 \times 2 \text{ gallons}}{11{,}000 \text{ net ton miles}} \times 138{,}700 \text{ Btu/gal} = 252 \text{ Btu/NTM]}$$

Conclusions

The continued reference, primarily by the waterway promoters, to the rail versus waterway average energy consumption values of 750 and 500 Btu/NTM respectively in the December, 1971 Rand Study by Dr. W.E. Mooz greatly distorts the true energy consumption comparison between the two modes. This comparison clearly suggests that the rail mode requires 50% more energy than the waterway mode for freight transportation.

Based on the corrected energy consumption values furnished by Dr. Mooz and values from three other reports sponsored by the National Science Foundation or the Federal Railroad Administration, the average rail and waterway energy consumption values are 672 and 582 Btu/NTM respectively. Correcting these values for the increased circuity by water as compared to rail gives a rail to waterway comparison of 672 to 785 Btu/NTM respectively.

A more meaningful energy consumption comparison between the rail and waterway mode would compare only that portion of the total railroad freight movement, such as the large tonnage unit train movement of dry bulk commodities, which competes directly with waterway movements. The one unit train fuel consumption value available to date is 252 Btu/NTM which may or may not be typical of unit train movements of dry bulk commodities. A comparison of this value with the circuity corrected average value of 785 Btu/NTM for the waterway mode reveals the average waterway fuel consumption value is over 3 times as great. While additional unit train fuel consumption values need to be obtained to establish the average and range of values, this comparison tends to suggest that the energy requirements for a round trip unit train movement of waterway competitive freight traffic is considerably less than the average energy requirements for waterway movements.

EXECUTIVE COMMITTEE
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April 29, 1974

Mr. Arthur L. Johnson
Acting Chief, Engineering Division
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St. Louis, Missouri 63101

Dear Mr. Johnson:

This is a reply to your letter of March 5, 1974 to the Western Railroad Association requesting comments on the March, 1974 Draft Environmental Statement for Locks and Dam No. 26 (Replacement), Mississippi River, Missouri and Illinois, prepared in response to the National Environmental Policy Act of 1969, PL-190.

<u>Deadline for Submission of Comments</u>

While your letter suggested an April 22, 1974 deadline for comments, the C.E.Q. (Council on Environmental Quality) guidelines for draft environmental impact statements provides a minimum 45 day period for public review and comment from the date of the FEDERAL REGISTER notice of availability. The C.E.Q. notice of availability of the draft E.I.S. for Locks and Dam No. 26 (Replacement) appears on pages 10010 and 10011 of the Federal Register for Friday, March 15, 1974 and indicates the minimum period for public review extends thru April 29, 1974. Please correct the address for the Western Railroad Association used in your letter of 5 March 1974 which was delayed two weeks.

Magnitude of Commercial Navigation Expenditures Proposed in Upper Mississippi River Basin

The railroads which serve the states in the Upper Mississippi River Basin have a vital interest, as important taxpayers and essential common carriers, in the extensive Federal expenditure proposals for commercial navigation improvements in the Basin, which include replacement of Locks and Dam No. 26. The estimated cost of these improvements, which the Corps of Engineers indicates will be needed in this Basin by the year 2000, is $3.2 billion.[1/] This amounts to an average expenditure of one million dollars every three days for the next 27 years. This estimate of the cost of these improvements would even appear to be on the low side since, for example, it includes only $203 million for replacement of Lock & Dam No. 26 whereas the current cost estimate for this project is $382 million.

Would These Expenditures Represent Efficient Use and Conservation of Our Nations Resources?

In view of the significant under-utilization of the railroad industry's extensive basic transportation facilities, consisting of 200,000 miles of track and associated structures, and the railroads' favorable comparison with barge transportation in both the cost of the resources and the energy consumption required for high volume movements of dry bulk commodities, such as coal and

1/ Table J-32 on page J-111 in Appendix J of the Upper Mississippi River Comprehensive Basin Study dated 1970.

grain, it is difficult for the railroads to comprehend how this proposed expenditure of over $3.2 billion for commercial navigation improvements could represent efficient use and conservation of our Nation's resources.

It is quite clear that an overall assessment of existing transportation facilities in the area of the proposed commercial navigation improvements is needed in order to resolve this question. The specific information which needs to be developed includes the following:

1. Projected growth of transportation needs and traffic in the affected area.

2. Relative efficiency of the various modes of transport.

3. Available transportation services in the area.

4. General effect of the proposed investment on existing modes and on the regional and national economy.

5. An environmental effect comparison between the available modes of transportation (i.e., does one mode produce greater pollution than another, be it air pollution, water pollution or noise pollution).

6. Energy consumption comparison between the available modes of transportation.

It is most important to point out that little or none of the above information was developed in either the project document (June 1968 Report on Replacement, Locks and Dam No. 26, Mississippi River, Alton, Illinois) or in the March 1974 Draft Environmental

Impact Statement with the exception of item #1 which was determined solely from the viewpoint of the barge operators and waterway shippers.

Adverse Effect of Subsidized Navigation On the Railroad Industry

An additional question which needs to be considered is whether or not it is sound policy to continue to subsidize the navigation features of water resource projects at the expense of railroad transportation. The extensive diversion of profitable line-haul traffic from railroads to subsidized waterways further aggravates the railroads' problems of excess transportation capacity and low earnings, while at the same time the services provided by the railroads meet essential national needs.

In order to help keep the railroad industry solvent, the Department of Transportation has recently proposed substantial abandonment of little used and uneconomical railroad branch lines. While this proposal has met with some public disapproval, the railroads find it progressively more difficult to compete with subsidized modes of transportation. A recent D.O.T. report [2/] states "we cannot pretend that the distortions in transportation investment due to massive public expenditures for highways, aviation systems, waterways and the like have not been a substantial factor

[2/] "First Annual Report on the Implementation of the Statement on National Transportation Policy", U.S. Dept. of Transportation, May, 1972.

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in the decline of other modes and services." This report also indicates that there are "sizable capacity surpluses of our long-haul rail network"; that "it has become clear that there are impressive opportunities for improving many elements of our transportation system simply through the more effective use of existing facilities", and that the cost of such improvements "is minimal when compared to costs for comparable capacity increases through creation of new capital facilities, with all of their attendant environmental and social costs."

Income Transfer From Other Modes Must Be Determined

It is most important in the evaluation of navigation project proposals that the potential loss of net income to other modes of transportation be determined. This is clearly an adverse economic effect which needs to be considered for any proposed water resource project. Such a determination is necessary in order to establish the net benefits (i.e., the real savings in the economic cost to the nation of providing transportation service) for navigation projects. As stated by Dr. Robert H. Haveman, Professor of Economics, University of Wisconsin, in his book "The Economic Performance of Public Investments" (Resources For the Future, 1972), that part of the transportation rate savings to waterway shippers consisting of the difference between rail rates and real rail costs "is simply an income transfer from the owners of railroads and/or the purchasers of their service" and does not represent real savings in transportation costs.

To the best of our knowledge the St. Louis District has not as yet indicated an interest in developing information on the loss of net income to other modes, namely the railroads, which would result from the replacement of Locks and Dam No. 26. The Western railroads through the Western Railroad Association are ready and willing to develop this information and can proceed to do so whenever the St. Louis District expresses an interest in having the information developed and furnishes to this Association the specific backup information needed for such a determination. In order to develop meaningful information on loss of rail income that would dovetail with the St. Louis District's project economic analysis, it is most important that the determination be developed from the same selection of commodity movements and rail rates used in the St. Louis District's economic analysis.

As indicated on page E-43 of the "project document," the commodity movement and rail rate information which was used in the St. Louis District's economic analysis of the replacement of Locks and Dam No. 26 was developed by Charles Donley and Associates (under contract No. DACW 43-68-C-0034) in its May 15, 1968 report titled "Traffic Survey - Locks and Dam No. 26, Mississippi River, Vol. I and II". It is obvious that this report presents the information necessary for the railroads to proceed to develop estimates of their potential loss of net income from the replacement of Locks and Dam No. 26.

To date the railroads have been denied the opportunity to have access to the Charles Donley and Associates traffic survey reports to the Corps dealing with either Locks and Dam No. 26 or with the Illinois Waterway. Letters dated March 15, 1973 and April 26, 1973 from the Chicago District Engineer and North Central Division Engineer respectively informed the Chicago, Rock Island and Pacific Railroad Company that "it would not be proper for the U.S. Army Corps of Engineers to release all or portions of the Donley Rate Studies" because many of the rates in the Donley Studies involved "contract movements of a single or combined mode which are not covered under tariff regulation and are therefore privileged and confidential."

Of the various rates presented in the Donley traffic survey reports it is only the rail rates which the railroads would need to have access to. Since all rail rates are covered by I.C.C. tariff regulation, it would seem that a copy of the Donley report with all rates except the rail rates blocked out would not reveal any confidential data and yet would be adequate to permit the railroads to estimate their loss of net income. A copy of this letter is being sent to the St. Louis District Engineer, Col. Thorwald R. Peterson, with the request for one such copy of the Donley traffic study for Locks and Dam No. 26 and for a joint cooperative effort to develop the potential loss of net income to the railroads due to the replacement of Locks and Dam No. 26.

The importance of determining the relationship between rail rates and rail costs was clearly established in the Pittsburgh District Engineers' April 1965 re-evaluation study of the economic feasibility for the 120 mile - one billion dollar Lake Erie-Ohio River Canal Project. This was the first and only waterway project study by the Corps which developed both rail rates and costs. The project economic analysis report prepared under contract by Arthur D. Little, Inc. indicated that for the movement of dry bulk cargo, which would constitute 97% of the initial prospective canal traffic, the transportation cost by rail was less than by barge. A total of 92.7% of the transportation rate savings to the waterway users would merely represent a transfer of net income from existing rail carriers with no economic benefit to the nation.

Replacement of Locks and Dam No. 26 is an Intregal
And Interconnected Part of a Comprehensive
Master Plan for Commercial Navigation Improvements
In the Basin and Must be so Evaluated.

Information presented in the Upper Mississippi River Comprehensive Basin Study, the Phase I Report for the Mississippi River - Illinois Waterway 12 Foot Channel Study, the General Design Memorandum No. 2, and the Draft Environmental Impact Statement clearly establishes the fact that replacement of Locks and Dam No. 26 is an integral and interconnected part of a comprehensive master plan for commercial navigation improvements in the Upper Mississippi River basin. The economic justification and to a major extent the need for replacement of Locks and Dam No. 26 are

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dependent upon subsequent alterations or replacements of all the locks in the Illinois Waterway and a substantial number of the locks upstream on the Mississippi river. As clearly pointed out on page 3-18 in the Draft EIS, "To be able to carry the amount of cargo forecast will necessitate alteration or replacement of other locks and dams in the system." Yet, neither the cost of these subsequent improvements nor their environmental impact were considered in either the project document or the Draft Environmental Impact statement.

The total cost estimate for the alteration or replacement of upstream locks and dams necessary to carry the amount of traffic forecasted in the economic justification for replacement of Locks and Dam No. 26 is probably on the order of $1.3 billion of which about one-half would be spent for the Illinois Waterway locks. While the following statement (on page 42 of the project document) "Locks No. 26 must be considered in combination with duplicate locks on the upper Mississippi and replacement locks on the Illinois," was made with specific reference to the size of the lcoks, it is equally true that the need, economic justification and environmental impact of Locks and Dam No. 26 must also be considered in combination with all the proposed alterations or replacements of the other locks and dams in the upper Mississippi River navigation system including the Illinois waterway. It is a system wide replacement or alteration of commercial navigation facilities that is being proposed and not merely the replacement of structures at one lock and dam location. The practice of using the total traffic projection for a system wide improvement in justifying but a small portion of the total improvement required to obtain the total traffic projection is unacceptable.

It is equally clear from the May 1973 revision of the Phase I Report on the Mississippi River - Illinois Waterway 12 Foot Channel Study that the 12 ft. channel proposal is interconnected with the replacement and duplicate lock proposals and should be evaluated together with respect to the need, economic justification, and environmental impact. According to the Phase I report it is not feasible to obtain a 12-foot channel with the existing locks. On the other hand it does not seem proper to build all of the replacement or duplicate lock structures for a 12 ft. project depth prior to even determining the overall economic justification and environmental impact for the 12 ft. project. The statement on page 3-19 of the Draft Environmental Impact Statement that lowering the depth of the sill in the locks, which is required for a 12-foot channel, "lowers construction costs" must be questioned. As indicated on Plate 5 of the May 1973 revision of the Phase I Report for the Mississippi River - Illinois Waterway 12 ft. Channel Study, which shows a typical lock supported on piling, the elevation of the lock floor need be no lower than the downstream sill but, of course, must not be higher. Lowering the elevation of the downstream sill therefore lowers the maximum

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elevation of the lock floor which significantly increases the total volume of concrete in the lock walls. The only partially off-setting cost savings is in the length of the steel pilings.

The practice of justifying (and proceeding to build) an initial segment of a system wide improvement on the assumption that remaining segments will be justified at some future time is unacceptable. What can happen under these conditions is that if time proves the first segment can not live up to its potential (which potential was undoubtedly based on construction of the entire system improvement) then the claim is made that additional segments must be built in order to realize the potential benefits for the first segment. When the economic feasibility of completing the entire project is subsequently evaluated the cost of the first segment is merely considered a sunk cost and doesn't enter into the benefit to cost ratio.

A similar situation exists with reference to replacement of Locks and Dam No. 26 and the Illinois Waterway duplicate locks. The project document economic analysis for replacement of locks and Dam No. 26 uses a traffic projection for project justification which is based on the assumption that the Illinois Waterway will subsequently be modified to provide supplemental 110' by 1200' locks at each of the current seven lock locations as authorized by the River and Harbor Act of 1962. The current estimated cost for the Illinois Waterway duplicate locks is $650 million compared to the project document estimate of $119 million and the current estimated average annual charges are $30.5 million in contrast to $4.6 million in the project document. It is obvious from these figures that the economic justification for this project has changed considerably since it was originally authorized by Congress. There is apparently little question but that without the replacement of locks and Dam No. 26 the economic justification for the Illinois Waterway duplicate locks would have to include the cost of replacing Locks and Dam No. 26. However, once construction for replacement of Locks and Dam No. 26 has been started, the Corps economists plan to consider this to be a sunk cost in their subsequent analysis of the economic justification for the duplicate locks.

One of the pertinent conclusions presented on page 45 of the May 1973 revision of the Phase I Report for the Mississippi River - Illinois Waterway 12 foot Channel Study is, that with respect to the proposed 12 foot navigation channel, "neither the Mississippi River reach from Cairo to Grafton, Illinois, nor the Illinois Waterway reach from Grafton to Chicago can be considered separately inasmuch as 60 percent of the waterway traffic is through commerce which must use both reaches." Based on the same reasoning the lock replacement at locks and Dam No. 26 for the purpose of subsequently obtaining a 12 foot channel and increased barge traffic cannot be considered separately from the proposed lock replacements on the immediately adjoining Illinois Waterway which are also for the purpose of subsequently obtaining a 12 foot channel and increased barge traffic.

An Over-All Economic Analysis of the Proposed Lock Replacements Within the Upper Mississippi River System Has Been Made But Has Not Been Used, Up-Dated, nor Made Available For Public Review

The Draft E.I.S. on page one-12 states, "The project benefits are contained in the project document ---- and in Locks and Dam No. 26 (Replacement), Design Memorandum No. 2." The Draft E.I.S. on page one-12 then indicates the current estimate of annual benefits is $43,344,000. Why this estimate is almost 40% greater than the estimate of $31,229,000 presented in the project document report dated June 1968 is not indicated; and it is doubtful that such information has been made available to the public for review. Since $19,370,000 or 62% of the total project benefits in the project document were based on benefits for the future potential Illinois Waterway traffic movement within the Illinois Waterway (assuming the Illinois Waterway duplicate locks will be constructed), there is the strong likelihood that a sizeable portion of the same benefits to the waterway shippers will be used in the subsequent economic analysis of the Illinois Waterway duplicate locks. It should be obvious that an over-all economic analysis of all the proposed lock replacements within the Upper Mississippi River navigation system is needed in order to obtain a meaningful economic justification evaluation. [As previously stated, this analysis should include the 12 foot project proposal. An environmental impact analysis for this system-wide improvement is also needed.]

It is probably not generally known that an overall economic analysis of the benefits and costs for all the proposed lock replacements within the Upper Mississippi River system has been made by the St. Louis District and presented in detail in Appendix A of Design Memorandum No. 2 for Replacement of Locks and Dam No. 26. While a major portion of Design Memorandum No. 2 has been made available by the St. Louis District for general distribution, Appendix A and other portions of this report are classified by the St. Louis District as restrictive material and have been removed from the copies of the reports given general distribution. A summary of the results of the over-all system economic analysis in Appendix A <u>and</u> the importance which Design Memornadum No. 2 gives to this analysis are stated as follows on page 20-1 of Design Memorandum No. 2:

> "The average annual costs directly applicable to Locks No. 26 are summarized on Table 20-1. As indicated, the total annual charges at the current 5-5/8 percent interest rate are $33,243,100. However, as discussed in detail in APPENDIX A, this cost does not reflect the whole picture. The improving of Locks No. 26 will only relieve the congestion at that point. The same problem will occur elsewhere in the system in the not-to-distant future. Thus, before a meaningful comparison of benefits and costs can be made, total system benefits and total costs had to be developed. These other average annual system costs total $33,089,200, resulting in

> total costs of $66,332,300. This procedure allows one to examine the economic effect on the whole system; and as can be seen in APPENDIX A, this resulted in total system benefits of $92,734,900, yielding a benefit - cost ratio of 1.4 to 1."

The St. Louis District is to be commended for having made an initial over-all economic analysis of the proposed lock replacement in the Upper Mississippi River navigation system. This analysis should be up-dated, expanded and used to assist in determining if this system-wide replacement is economically justified. While Appendix A indicates the average annual costs for the other proposed lock replacements total $33,089,200, this figure could be out of date because it barely exceeds the current estimated average costs for the Illinois Waterway duplicate locks. Other deficiencies in the economic evaluation of locks and Dam 26 replacement are the same as those covered in the National Water Commission's report of June 1973. These deficiencies were discussed in considerable detail in a paper presented at the "Session on River Basin Planning and Management" during the 35th Midwest Fish and Wildlife Conference, December 2-5, 1973. A copy of this paper is enclosed and shall be considered as part of these comments on the Draft Environmental Impact Statement.

The Consideration of Alternatives Did Not Include Studies of Other Modes of Transportation Yet The Existence of this Alternative Was Frequently Referred To

As stated in the Draft E.I.S. "Summary Sheet" the alternatives studied were limited to a "no action" alternative plus a

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consideration of six possible alternate locations for new 1200 ft. locks. It is therefore quite clear that alternative modes of transportation were not studied. While the project document and the Draft E.I.S. indicate the locks at L & D No. 26 are inadequate to handle either the present or prospective future barge traffic, the discussion regarding the availability of alternate modes of transportation was limited to the highway and rail modes only and was also limited to the St. Louis area. It is merely indicated in Part Two, Section III, D, 1 that "three interstate highways --- converge in the St. Louis Region" and "a multitude of railroads and their goods enter the St. Louis region from all directions." No comments were made as to the adequacy of these alternate highway and rail transportation facilities.

The section on impact of the "no action" alternative indicates "industries, which are dependent on river transportation, would be effectively confined or --- use alternate forms of transportation." It is also stated in Part Five, Section II, A, 2 that "The agricultural component would seek alternate modes of transporting goods." Regarding the fact that other modes of transportation constitute an alternative to the replacement of Locks and Dam No. 26, the Draft E.I.S. concludes that, "Eventually, the congestion problems caused by the navigation bottle-neck would lessen or at least level off because expenses to shippers due to additional delays would make competing forms of transportation more desirable."

In Part Six it is stated, with respect to the construction of the replacement locks and dam No. 26, "If the commitment is not made, alternative modes of transportation must be found." Prior comments tend to suggest there would be little or no problem in finding adequate transportation alternatives. A rather profound statement presented in Part Six regarding transportation alternatives is that "The project involves a trade off in that monetary resources that will be used for the project could be employed to improve alternative methods of transportation." If a study of transportation alternatives had been made it may well have indicated rail electrification would represent a much better long term transportation investment. Electrification would not only result in lower locomotive maintenance costs and provide the potential for higher speed and longer train operations on high-density rail lines, it would also help to reduce the demand for petroleum fuels and provide environmental advantages. Irrespective of the efficiency and other advantages of rail electrification, the high initial capital investment and the heretofore ample supply of relatively inexpensive diesel fuel has delayed extensive rail electrification by the privately owned American railroads. Any study of transportation alternatives should involve active participation by the U.S. Department of Transportation.

Extent to Which Low Barge Rates Are The Result
Of The Public Subsidized Inland Waterway System

On pages Two-44, Three-17 and Six-1, reference is made to low-cost barge transportation. These statements need to be clarified since what is really meant is low-cost to the shipper and therefore the word rate rather than cost is more appropriate. The Federal cost of constructing, maintaining and operating the inland waterway system is never reflected in barge rates but is, of course, an important item in the total cost of waterway transportation. As to the importance of this subsidy in keeping traffic on the waterways, the National Water Commission inter-agency task force report in 1973 on water resource project cost sharing estimated 60% of the current waterway traffic would be diverted to other modes if a 100% recovery of the annual Federal costs for navigation projects were to be levied on the wayterway users.

That portion of the regulated intercity carriers' total operating revenue which is required for right-of-way maintenance and investment costs and taxes 3/ amounts to 24.9% for railroads, 4.4% for intercity trucks and 0.0% for water carriers since these costs for the inland waterway system are paid for by the Federal tax payer. The Draft E.I.S. indicates, on page Three-17, that the

3/ See Table 11 - Costs and Taxes for Right-Of-Way, (to the) Regulated Intercity Carriers, in the May 1973 edition of the annual A.A.R. Economics and Finance Department publication on "Government Expenditures for Highway, Waterway, and Air Facilities and Private Expenditures for Railroad Facilities."

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advantage of barge transportation in transportation cost (i.e. lower transportation rate to the shippers who use the subsidized inland waterway system) is "partially a result of the public subsidization of waterborne commerce in the form of publicly-funded projects such as Locks and Dam No. 26." One can obtain an estimate of the average amount which shippers who use the inland waterway save by having the Federal taxpayer pay the inland waterway right-of-way costs instead of having to share the burden of railroad right-of-way costs. The latest estimate of the average railroad operating revenue presented in the 10th Edition of the Transportation Association of America's annual "Transportation-Facts & Trends" is 1.62 cents per ton-mile or 16.2 mills per ton mile. Since 24.9% of the railroad operating revenue is required to cover right-of-way costs and taxes, these costs and taxes amount to (16.2)(24.9%) = 4.0 mills per ton-mile. [While Federal financing of the inland waterway system relieves waterway shippers from the burden of helping to pay for railroad right-of-way costs and taxes, this places a greater cost burden on the other railroad shippers since most of these costs and taxes are fixed costs.]

Having established that a rail to water diversion of freight traffic should automatically save shippers about 4 mills per ton mile merely by not having to contribute (thru rail freight rate charges) to the railroad right-of-way costs and taxes, it is important to establish whether or not this is essentially all that is accomplished by inland waterway projects in the way of rate savings to waterway shippers. The results of a study of actual rate savings to waterway shippers in 1970 for freight traffic thru locks 26 were presented in Appendix E of the project document. A weighted average savings of 5.4 mills per ton-mile was indicated on pages E-43 and E-44, but this is considerably high because it was obtained by an incorrect procedure.4/ For five of the seven commodity groups the alternative mode is primarily the railroads. For the petroleum group the alternative is mostly pipelines and for the cement, stone, sand, and gravel commodity group the alternative is mostly trucks. A separate average rate savings determination for the five commodity groups where the railroads are the alternative gives a value of 3.8 mills per ton-mile. This indicates

4/ Weighted savings were obtained by multiplying the tonnage for each of seven commodity groups by the savings per ton-mile for that commodity. The total weighted savings was then divided by the total tonnage to obtain the weighted average ton-mile rate savings value of 5.4 mills. This procedure is incorrect. The average rate savings per ton mile should have been obtained by dividing the summation of the product of the rate savings and ton miles by the total ton miles. The savings per ton mile for the commodity group consisting of cement, stone, sand and gravel was 5.3 to 21.5 times as great as the savings per ton-mile for the other six commodity groups. This fact plus the fact that the average length of haul for these commodities is very short compared with the average length of haul for the other commodity groups explains why the 5.4 mill per ton-mile value is considerably high.

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the rate savings to waterway shippers from a rail to waterway diversion of traffic is of the same order of magnitude as the potential savings which come about automatically by merely not having to contribute to the railroad right-of-way costs and taxes.

This suggests that if it is necessary or desirable from the public viewpoint to provide subsidized transportation to the large shippers who could use the inland waterway system, it might make more economic sense for the Federal Government to encourage greater utilization of our vast railroad system by providing a direct subsidy to the prospective waterway shippers if they would ship by rail. The amount of the subsidy could be equal to their potential rate savings for barge transportation or merely the average cost per ton mile to cover the railroad right-of-way costs and taxes. While other railroad shippers who would not be in a position to ship by water might consider such a subsidy to be unfair, it would still be a better deal than they are currently getting in that their contribution towards covering the railroad right-of-way costs and taxes would be reduced.

According to Mr. Charles F. Luce (former Chairman of the National Water Commission) in his keynote speech during the January 29 thru February 2, 1973 national meeting of the American Society of Civil Engineers), the economics of some waterway projects are so distorted that if you took the Federal money spent for the waterway project and set up a trust fund, you could ship all the anticipated waterway traffic by rail at no cost to the shippers! While this situation leaves much to be desired, special care must be taken to avoid a continuation of this policy especially since the prior inland waterway project evaluation deficiencies continue to exist.

<u>The Environmental Impact Statement Should Present An Environmental Effect Comparison And An Energy Consumption Comparison Between the Available Modes of Transportation</u>

Since there are transportation alternatives to the proposed project, the environmental impact statement should present a comparison of the environmental impact between the proposed project and the transportation alternatives. This comparison should include the matter of air pollution and water pollution. One reasonable approach to a comparison of air pollution would be to develop a meaningful and appropriate energy consumption comparison. Since diesel engines are used for the rail, truck, and waterway modes of transportation, a fuel consumption comparison would also give an approximate air pollution comparison.

It is important that a thorough study be made with respect to the energy consumption comparison between the available modes of transportation. Apparently the St. Louis District is aware of the fact that not all the studies which have been made

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of the energy intensiveness of freight transportation are reliable and appropriate. As indicated in the list of Tables on page viii of the draft environmental impact statement, it was originally intended that Table 1 on page three-29 would present values regarding the "Energy intensiveness of selected transportation modes." We have been informed that this table and the associated discussion on the energy intensiveness of selected transportation modes in Part Three were removed prior to distribution of the Draft E.I.S. because it was believed the values which were presented could not be substantiated. While the St. Louis District is to be commended for removing material which it subsequently considered is open to question, the net effect is that there is no mention whatsoever of the subject of differences in energy intensiveness between the various modes of transportation.

For the past several months this office has been developing all that is available in the way of information on freight transportation energy consumption in general and on a consumption comparison between the barge and rail modes of transportation in particular. We prepared a preliminary discussion of some of the factors which need to be considered in an energy consumption comparison between the barge and rail modes in January of this year which was given limited distribution. This discussion stressed the importance of considering the difference in circuity between the two modes and that a meaningful comparison requires that only that portion of the total railroad freight movement which competes directly with waterway movements should be considered. A copy of this preliminary discussion has been given to Dr. Hanley K. Smith, Ecologist, St. Louis District.

We have subsequently developed additional information on the actual fuel consumption of unit train operation. A comparison of these values with the average barge fuel consumption values developed by the National Waterways Conference indicates a significant difference in fuel consumption exists between the two modes for volume movements of dry bulk commodities. In view of this significant difference we believe it is important that the St. Louis District give further study to the subject.

We would be pleased to provide any assistance that we can.

Sincerely yours,

George E. Anderson

George E. Anderson
Water Resources Analyst

GEA/ml

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Apr. 6, 1974

Colonel Rodney E. Cox
District Engineer
St. Paul District Corps of Engineers
1210 U.S. Post Office and Custom House
St. Paul, Minnesota.

Dear Colonel Cox

The following comments are in reference to the Draft Environmental Impact Statement, Operation and Maintenance, 9-Foot Navigation Channel, Upper Mississippi River, Head of Navigation to Guttenberg Iowa. Feb. 1974.

The body of the draft statement seems to present a ballanced discussion pf the problems of maintenance of the 9-foot channel. The discussion of the alternative measures and plans covered many of the problems involved with any approach to multiple use, long term management of the 9-foot channel.

However there are a number of comments regarding specific points in the draft statement. The page numbers referredto below are from the draft statement.

xi. The statement "The placement of maintenance dredge spoil requires that aquatic and semi-aquatic habitats adjacent to the navigation channel be converted to sandy islands which tend to eventually develop typical bottomland vegetation.", seems to be an over generalization. Discussion in the draft statement and in the North Star reports indicate that the lack of nutrients, xeric conditions, or the shade of the mature bottomland forest all prevent or modify the successional sequence. I am not aware of data indicating the development of "typical" bottomland vegetation as a result of succession on any areas other than open sand banks and bars resulting from dredge spoil.

p.173 There is a southern extension of Effigy Mounds Monument at Sny Macgill Creek. At present it is not developed but there is river access at this site through the Sny Macgill landing operated by the Iowa Conservation Department.

p.181 As a result of the current shortage of fossil fuel an increased utilization of nearby recreation areas is to be expected. The proximity of the Upper Mississippi River to both

Minneapolis-St.Paul , and Chicago will probably result in increases in water related activities well in excess of the five fold increases predicted from the 1960 census values.

p.258 There is a boat landing in the backwaters of the Mississippi, accessible through Wyalusing State Park in Wisconsin.

p.301 In addition to Dams 4,6,7, and 8 aeration facilities were also constructed in Dam 9.

p.308 While recovery by sprouting and seed germination is possible in the open sites or in willow-cottonwood stands, it is difficult or impossible in the stands of mature elm, maple, and ash. The normal early colonizers of sand are shade intolerant and do poorly in the shade cast by the mature trees. The seedlings and saplings with normally low densities in these mature stands are most susceptible to damage from spoil deposition. Commonly the result of spoil deposition is the removal of the successional understory. Death by desease, such as Dutch Elm Desease, or normal senescence of the remaining overstory can result in the complete elimination of mature bottomland forests. Normal successional patterns are distorted, resulting in the development of new disclimax of questionable value.

p.347-351 There is potential for problems in sediment control of the Wisconsin river since even though the sediment input of the Wisconsin is greater than that from the Chippewa, the majority of the sediment is carried into the Rock Island District as bed-flow in the Mississippi. Cooperative planning between the St.Paul district and the Rock Island district will be necessary to handle the sediment.

p.363 Care should be exercised in the selection of seed for plantings. Use of exotic species, southern strains of commercially grown native seed, and species incompatible with recreation use (ie. triple awn grass, sand bur, exhibit 190) may all have undesirable consequences.

p.576 The final two sentences seem to bias the report in favor of the status quo, ignoring the damage to the environment recognized in the rest of the report. While it is difficult to obtain a quantitative dollar value on the loss in habitat and biota, and the benefit of the projected recreational and habitat improvements, it must be recognized that it does offset, at least in part the suggested benefits accrued from barge navigation and the costs of the alternative plans. The importance of the habitats being lost are recognized by several other governmant agencies, as indicated by the following excerpts.

"As cities become larger and urban pressures more pervasive, there is a growing need for places of refuge and renewal, a need that becomes increasingly urgent as masses of people flock to accessible senic areas, particularly along waterfronts and shore-lines. Islands can help fill that need only if the burgeoning urbanization that gives them a new recreational value does not also overwhelm them with the kind of development that makes public recreation impossible.

Numerous islands near urban areas are currently threatened with adverse commercial development- and in some cases governmental projects- that would destroy their value for public use.

It is recommended that States adopt effective regulations for dredging and filling in order to preserve the natural and recreational qualities of island environments.

Dredging and filling near and on islands can efface natural features and reduce recreation space and fish and wildlife habitat. Where dredging is justified, care often can be exercised to minimize damage. In navigable waters States share general authority for this work with the U.S. Army Corps of Engineers, but State regulations have shown little concern for the protection of natural and recreational features." Islands of America. Bureau of Outdoor Recreation, Department of Interior. 1970.

In the Iowa Conservation Commission's recreation plan Outdoor Recreation in Iowa 1972, the high priority needs for N.E. Iowa, the area including pools 9 and 10, were a need to protect the water corridors, sites for camping and natural environment swimming and preservation of large primitive areas.

An indication of the importance of this type of utilization is indicated in the following statement from the plan. " It is essential that land acquisition and development programs reflect the maximization of public benefits and encompass responsibilities that are not quantifiable such as the open space role, preservation programs, landscape esthetics, research, etc. In the case of many of the public state areas, expansion to include a broader realm of activities is essential. Management of all land, public and private, must reflect the maximizing of public benefits. "

As was noted earlier, it isdifficult to arrive at a value for recreation use to offset the costs of alternate management plans. The projected cost of acquistion and development in the Iowa plan does give one estimate of the value of the bottomland sites, from the standpoint of replacement costs. The six year projection for the north-eastern 14 counties is 3,539,486 dollars for acquistion and 3,739,073 for development. In the last year Iowa in a separate program , the Open Space Land Acquisition Program, has spent two million dollars to aquire land for preservation against future resource need.

While none of these can be directly converted to value of the lands destroyed by dredge spoil it does indicate that these areas have a positive value that must and can be ballanced against the low cost of the present program of dredge spoil disposal.

I appreciate the oportunity to comment on the draft statement and I hope that from this effort a new positive program of resource management will be developed to maximize all the divergent demands on the Upper Mississippi River.

Sincerely
Edward T. Cawley Ph.D.
Edward T. Cawley
Director, Environmental Research Center.

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ST. PAUL DISTRICT

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the
WATERWAYS JOURNAL
Weekly
SINCE 1887

701 CHEMICAL BUILDING
ST. LOUIS, MO. 63101
314-241-7354

ABC

April 24, 1974

Colonel Rodney E. Cox
St. Paul District Engineer
1210 Custom House
St. Paul, Minnesota 55101

Dear Colonel:

I am taking the liberty of forwarding herewith a statement regarding the environmental impact statement which St. Paul District recently issued on the nine-foot channel on the Upper Mississippi River in the St. Paul District.

We have limited our statement to a general analysis of the nine-foot channel and I trust that it will be considered and made a part of the record for the EIS evaluation of the nine-foot channel project.

We appreciate this opportunity to submit the statement and trust you will find it of value.

Respectfully,

James V. Swift
James V. Swift
Vice President

JVS:mr
Encl.

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LETTER OF COMMENT
THE WATERWAYS JOURNAL

Statement of The Waterways Journal
701 Chemical Building
St. Louis, Mo. 63101

In regard to the Environmental Impact Statement
on the nine-foot Channel in the St. Paul Engineer District

April 24, 1974

The Waterways Journal is a weekly publication which has been serving the inland waterways of the United States since 1887. During that time members of the staff, past and present, have seen the development of the inland waterways of this country into one of the most efficient avenues of water transportation in the entire world. We have also been working for the continued development of these waterways and have been closely associated with the men and organizations who have spent much of their time and money in furthering these developments.

Because of our interest in the Upper Mississippi River as an important segment of the inland waterways system of the country, we wish to express our appreciation to you for allowing us to present our opinion on the environmental impact statement which has been completed on the Locks and Dams in the St. Paul District.

We would like to confine this to a general statement on the entire nine-foot channel on the Upper Mississippi River in the St. Paul District. We understand that copies of this statement will be attached to the comments received on impact statements for the locks, dams, and pools in the St. Paul District at the public hearings.

We wish to point out that it is because of the stable water resulting from the construction of the lock and dam system on the Upper Mississippi, to make possible the nine-foot channel,

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that there is such an abundance of fish and wildlife along the Mississippi River at this time.

Before the completion of this system, water fluctuations damaged the fish populations and did not give wildlife the ample supply of water that it has now. This particularly applies to ducks and geese who use the Mississippi River flyway. Previously during times of low water in the fall, thousands of fish died as pools and sloughs dried up along the river. The state of Illinois even maintained a steamboat, at considerable expense, to salvage these fish when the river began to fall in these low water periods.

May we also call your attention to the fact that the Environmental Protection Act calls for an equal consideration of the benefits of wildlife conservation and economic benefits of the human race. Nowhere can we find that Congress put the welfare of fish and wildlife above that of the American citizen. Unfortunately, this fact has not been considered, apparently, by many environmental proponents who have been critical of further improvements on the Upper Mississippi River and the nine-foot channel as well.

We honor the men and organizations who had the foresight to bring the nine-foot channel into fruition. It has been beneficial to the people of the Upper Mississippi River in many ways. Although the reason it was initially promoted was for transportation savings, it's benefits have been much more than that if one looks at the recreation along the Upper Mississippi, the stable water supply for cities along the Mississippi, better water quality, and the general well-being of the region.

We support the nine-foot channel and are proud of what it has done for the people in the Upper Mississippi River Basin. Some of the objections made to the nine-foot channel are in the category of "nickpicking." It should be pointed out that as far as pollution is concerned from barges oil tows operating on the Upper Mississippi River they have been there for many years, particularly since World War II. The scenery is still beautiful on the Upper Mississippi, there are plenty of fish, and the river can be enjoyed. May we also point out that there are very stringent anti-pollution regulations in force, which are policed by the United States Coast Guard, and any spills of petroleum products on the waterways must be cleaned up as far as practicable before they cause any environmental damage.

There are also some comments that barges are damaging trees because lines are put on them for tying off tows. Considering the number of trees in the Upper Mississippi Valley, we cannot see what great and lasting effect this will have on the environment.

James V. Swift
Vice President

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