

# **Upper Mississippi River & Illinois Waterway System Navigation Study Feasibility Report**



## **Secondary Benefits Associated with Large Scale Improvements**

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**US Army Corps of  
Engineers**

Rock Island District  
St. Louise District  
St. Paul District

# **Secondary Benefits Associated with Large Scale Improvements**

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## **Introduction**

The purpose document is to present some of the analysis completed to quantify some secondary benefits associated with large-scale improvements. As the formulation of alternatives progressed to the point where definitive implementation schedules were developed, it became apparent that the without project investment needs would need to be reinvestigated. The preliminary economic analysis indicated that lock extensions at locks 14-25 and new locks at Peoria and LaGrange might be justified in the next 25 years. The anticipated rehabilitation schedules for these sites were also expected to occur in the next 25 years. This effort guaranteed that all economic benefits were fully captured in the plan formulation. In the initial formulation only crude attempts were examined to capture benefits and cost associated with items presented herein. This effort gave a more detailed account of these secondary benefits not fully understood during the initial plan formulation.

## **Major Rehabilitation Cost Avoidance**

If large-scale improvements (lock extensions) are undertaken at location 2 in the 2005-2015 timeframe, construction work associated with these projects will address many of the major rehabilitation needs at each lock site. Typical major rehabilitation work such as machinery, electrical equipment, and emptying and filling components will be replaced, repaired or modified, lock gates will likely be replaced, and deteriorated or damaged concrete will be repaired by the lock chamber extension work. This situation results in the avoidance of one cycle of major rehabilitation at each of the respective sites that undergo a lock chamber extension. Thus, a detailed analysis was performed at these sites to determine if the implementation timelines would intersect and if a duplication of costs existed between the rehab investment and lock extension investment.

## ***Estimation of Rehab Need for Locks 20-25, Peoria and LaGrange***

Cost estimates for the future without project major lock rehabilitation projects were made. Many factors were used as indicators of component performance, and considered in the estimation of future lock rehabilitation at specific sites. Former major rehabilitation projects and periodic inspection reports were reviewed for each site that provided a vast amount of historical information. Government estimates from previous major rehabilitation projects served as the primary reference for future costs. By the year 2000, the majority of locks on the UMR&IWW had undergone a major rehabilitation. Due to the large number of rehabilitation projects performed a comprehensive database of costs for typical rehabilitation items existed. For items that would likely be replaced with innovative designs, costs were taken from “Report of the Task Force on Design and Construction Innovations For Locks and Dams, Phase I, Feasibility”, dated March 1993. If any line items on the future rehabilitation estimate significantly varied from past work, either a separate estimate was created, or a cost was extrapolated from the closest identified historical repair. The costs are shown in the tables presented in Appendix A of this report.

Historical lockage data was quantified and extrapolated into the future for consideration of those components subjected to cyclic loading. Common corrosion rates for the river environment were recognized in the consideration of steel structures, such as, culvert valves and sheet pile walls. Past rehabilitation procedures were weighed when estimating the longevity of structures. The methods typically used to repair or rehabilitate lock structures (partial member replacement, complete member replacement, cleaning and painting only, fastener replacement or welding) dictates whether the accumulation of corrosion and fatigue are initialized or allowed to continue once the rehabilitation is complete. Past failure rates of mechanical/electrical components were examined, as well as, the rates in which obsolescence occurs. These factors served as key indicators for the timing and scope of the future major lock rehabilitation for the without project scenarios.

For each item identified in the rehabilitation estimates, an expert team estimated a portion of the rehab item that would be eliminated by extension of the lock chamber. This illustrated the overlap of the Location 2 large-scale improvements and the projected rehab cost. However some items that would be included in the rehab where not included into the large-scale measures. These items would still require rehab in the future. This exercise was completed for the Locks 20-25, Peoria and LaGrange. The dollars estimated are presented in Appendix A of this report. Table 1 below summarizes they results of the analysis.

**Table 1: Stand-Alone-Rehab Cost and Avoidance Associated with Large Scale Improvement on the Lower Five Sites.**

	Stand Alone Rehab Cost (\$1,000)	Rehab Cost Avoided With Large Scale Improvement (\$1,000)
Lock 25	\$24,626	\$17,291
Lock 24	\$16,696	\$13,527
Lock 22	\$26,028	\$21,838
Lock 21	\$33,566	\$23,060
Lock 20	\$29,086	\$26,898
Peoria	\$63,389	\$46,865
LaGrange	\$69,782	\$48,783
Average	\$37,596	\$28,323

This analysis was separate of previous efforts to establish rehab and cost avoidance numbers. The intent was to confirm the numbers previously used. Based on the \$25 to \$30 million presented earlier in the study. Table 1 shows that the results previously used are fair and reasonable. One should consider that the numbers are projected 15 to 20 years from now. It is also recognized that predicting repair costs and schedules for future rehabilitation projects is very difficult and contains much uncertainty. The numbers contained in Table 1 are not exact and only represent approximations of the future. A sensitivity analysis was performed as part of the plan formulation. The bounds for this sensitivity analysis are defined below. It is impossible to predict future event with certainty but reasonable assumptions will yield general future trends.

One must recognize that major rehabs proposed in the past were performed under constrained budgets. Many items were identified for repair but were not completed in the past rehabilitation projects. In the past, items where identified for repair, they were prioritized and repairs were given to items that were within the budget and critical to the operation of the operability of the lock. For example, not all of the chambers were resurfaced. On most of the locks only the horizontal surface on the land wall was resurfaced. Items that were high budget items were often rejected. Examples of this include repair to the porie sills and concrete repairs to areas outside the dewaterable portion of the lock chamber. To assume that past major rehabs solved every problem at that time is a false assumption. Past rehabilitation projects only addressed critical items identified at that time. Many major repairs are often completed under the normal operations and maintenance budget and are not fully captured in the plan formulation process.

The greatest challenge in performing a sensitivity analysis is establishing bounds that are within the range of believability. For example, assuming that \$0 rehabilitation will take place in the next 50 years is not a believable proposition to those in charge of operating and maintaining the existing navigation system. On the same token, assuming rehab costs that equate to the highest individual site rehabilitation is also not supportable. A range of rehab costs between 20 and 35 million were developed by analyzing the high and low from the site-specific assessments performed at locks 20-25 and Peoria and LaGrange. These assessments are included in Appendix A of this report. The range of seven sites spanned \$17 million at Lock 24 to \$70 million at LaGrange. At Peoria and LaGrange, site specific conditions inflate the rehabilitation cost and after careful consideration the engineering work group felt that the range of \$20 to \$35 millions was appropriate for all sites under consideration.

The timing of rehabilitation's is also very uncertain and will be driven by many variables as outlined in the Without Project section of the Engineering Appendix. A range of 20 to 35 years was selected to represent the rehab interval expected for the sites under consideration. The original rehabilitation interval was developed on qualitative assessment and engineering experience. To date the intent of the major rehab was to extend the service life of the navigation structure and additional 25 years. So most major rehab projects have been design with 25-year design interval. The Rock Island District has executed major rehab projects since 1984. This experience lead to the engineering judgement that selected the rehab interval of approximately 25 years. Table 2 shows the expected rehab schedule based on Judgement of the Engineering work group.

**Table 2: Anticipated Lock Rehabilitation Schedule Based on Engineering Judgement of EWG**

TABLE A-3.2 ANTICIPATED LOCK REHABILITATION COSTS AND SCHEDULE (\$'s in Millions)									
Year	Future Without-Project Condition								
	UMR 25	UMR 24	UMR 22	UMR 20 & 21	UMR 19	UMR 15-18	UMR 14	IWW Peoria	IWW Peoria
2005					X				
2010									
2015			X	X				X	X
2020	X	X				X			
2025								X	
2030					X				
2035									
2040			X	X				X	X
2045	X	X				X			
2050								X	
2055					X				
2060									
2065			X	X				X	X

Another analytical approach examined past cycles and rehabilitation intervals to estimate future rehab timing. Using the historical data the engineering work group estimated the number of cycles to the first rehab for the lower five sites on the Mississippi. This range was developed by looking at the cycles of traffic in the without project condition. Cycles of use are an indicator in determining degradation of a facility and projecting when repairs or replacement will need to occur. Table 3 contains the expected rehab intervals if only cycles of use were used to schedule rehabilitation projects.

The spreadsheets used to develop table xxx are presented in Appendix XXX of this report. The analysis estimated the number of cycles between the construction of the lock and the first major rehabilitation completed at each site. Past cycles were estimated based on historical tonnage. The correlation between tonnage and cycles was developed with a linear regression analysis developed with data from 1980 to 1999. For these years both cycle and tonnage data are available. For example the first major rehab at Lock 22 was completed in 1990. At this time lock has experienced approximately 267,000 cycles. Therefore at lock 22, 267,000 cycles was selected as the rehab interval. Based on projected future traffic, future rehab intervals were estimated. The future traffic forecast where provided by the economic work group. This analysis was complete at Site 14 through 25, Peoria and LaGrange. The completed spreadsheets are provided in Appendix xxx of this report.

The shortest rehab interval occurs at locks 20 and 21 occurred after 270,000 cycles. Using the forecasted number of future cycles, the next rehab would occur at Locks 21 and

20 with a 21-year interval. The greatest rehab interval would occur at Lock 19 with a 35-year period. At lock 19 the next rehab project is scheduled for 2005. It is projected that Lock 19 will have 225,000 cycles at the time of rehab. With projected usage rates it is estimated that lock 19 will take 35 years to reach this number of cycles again. Of the locks considered in the system, these three sites appear to establish the bounds for the projected rehab timing. Thus 20 and 35 years was recognized as the bounds for the sensitivity analysis of rehab timing. It should be recognized that cycles of use are only an indicator of degradation and should not be used as an absolute in establishing rehab schedules.

**Table 3: Anticipated Lock Rehabilitation Schedule Based on Lock Cycles**

Year	Future Without-Project Condition						
	UMR 25	UMR 24	UMR 22	UMR 20 & 21	UMR 19	UMR 15-18	UMR 14
2005					X		
2010							
2015			X	X			
2020	X	X				X	
2025							X
2030					X		
2035							
2040			X	X			
2045	X	X				X	
2050							X
2055					X		

The assumptions for rehabilitation costs and intervals are critical to the plan formulation process. Major rehab cost avoidance benefits can be captured if the lock extension implementation schedule is aligned with the expected without-project rehab schedule. Rehabilitation of Lock 22 is anticipated in 2015. The lock extension estimate contains many of the components that will be replaced or rehabbed as part of the rehabilitation project. Implementing the lock extension at Lock 22 results in foregoing the expenditure of costs associated with the without-project rehab. This results in a cost avoidance benefit that can be considered in the selection of alternatives. More discussion on the details of the economic analysis and plan formulation process can be found in the Economic Appendix and in the main text of the Feasibility report. Table xxx shows the projected rehab schedule with Plan E.

The rehab schedule was developed again using cycles as the indicator for major rehab. The Rehab interval was established in the without project analysis presented in Appendix xxx. A similar analysis was completed for Plan E. The spreadsheets for this analysis are presented in Appendix xxx. For Locks 20 through 25, this analysis assumed that items to be repaired in the next round or Major Rehabilitation would be completed as part of the lock extension work. Additionally the future lock cycles would also change. Because new chamber would be 1200 foot and less cycles per tow would be required to complete a

lockage. However the increased tonnage projected with plan E would increase number of cycles. The Economic work group developed a regression between tonnage and cycles for the new 1200-foot chambers. Additionally the Economic work group provided future tonnage estimates. Thus future cycles could be forecasted with plan E. Based on the forecasted cycles the future rehab schedule was developed. While plan E would eliminates rehab cycles for the lower five sites. The increased tonnage would shorten the rehab interval for site 14 through 19. This was accounted for in the analysis. The tonnage for Plan E was used to forecast future cycles expected at sites 14 though 19.

**Table 4: Anticipated Lock Rehabilitation Schedule Based Lock Cycles for Plan “E”**

Year	Future with Plan E						
	UMR 25	UMR 24	UMR 22	UMR 20 & 21	UMR 19	UMR 15-18	UMR 14
2005					X		
2010							
2015							
2020						X	
2025							
2030							X
2035			X	X	X		
2040	X	X				X	
2045							
2050							

The analysis of lock cycle data confirms field observations of structure performance. It appears that most rehab program will last approximately 25 years and then major work will again be required again. Some projects will last long than others will need work before. However the 20 – 35 year intervals appears to be reasonable. The rehab schedules developed based on engineering judgement corroborates the rehab schedules base on lockage cycle data.

### **Redundancy Benefits Associated with Two Navigation Lock Chambers at One Site**

The costs presented to date in the UMR-ILWW navigation study do not represent the inherent benefits of having two locks. The likelihood of both locks being closed at once is very small when compared to a system with only one chamber. The redundancy gives much higher reliability to the navigation system. Table 5 illustrates the increase in lock availability with tow locks assuming both locks are 98% reliable.

**Table 5: Illustration of Improved Lock Reliability with Redundant Locks**

Number of Lock Chamber at a site	Percent of Time that a lock is available for navigation.
1 Chamber 98% Reliable	98%
2 Chambers Chamber A 98% Reliable Chamber B 98% Reliable	99.96%

Historical data shows that the locks have been approximately 98% reliable. Based on Table 5, it is possible to assume that the likelihood of 2 locks at one site being down is very small and the probability is virtually negligible. There is an increased benefit for having two locks chambers because at least one chamber will always be available for navigation. The only time that two locks are not available is during high water. Since the new lockwalls will be the same elevation of the existing lockwalls, both chambers will be closed at the same time due to high water. This is accounted for in the analysis.

To quantify the benefits, it is necessary to estimate the number of future lock closures for the study period. Closure data was examined from 1990 to 1999. This data was provided by the U.S Army Corps of Engineers, Institute for Water Resources, Navigation Data Center. For each of the lower five sites, the data presented frequency average length of closures. Table 6 contains the raw historical closure data used for the analysis. Using the raw data alone would result in overestimation of redundancy benefits. The new lock chamber will have lockwall heights the same as the existing chamber, Therefore, closure due to high water will occur on both chambers at the same time, and these benefits cannot be claimed. The raw data also contains scheduled closures. These closures are planned and the navigation industry is given notice so that it can adjust its schedule accordingly. However long closures associated with major rehabs will still have significant impacts to tow schedules. Thus the scheduled closures are handled separately in the presentation of the data.

Generally, the raw data contains closures due to random events, scheduled closures, and high water closures. The high-water closures and the scheduled closures are subtracted from the raw data to yield the random unscheduled closures. In some instances, the raw data was adjusted to account for long closures due to high water in 1993.

**Table 6: Raw Historical Closure data.**

	L/D	LaGrange	Peoria	25	24	22	21	20	Sum
1990	Avg Time (hrs.)	1.87	2.56	2.19	1.89	3.43	3.93	12.81	
	Freq.	36	33	80	97	93	77	75	
	Days per Year	2.81	3.52	7.30	7.64	13.29	12.61	40.03	87.20
1991	Avg Time (hrs.)	2.29	1.3	2.62	3.08	3.43	2.97	2.15	
	Freq.	21	23	76	67	56	45	61	
	Days per Year	2.00	1.25	8.30	8.60	8.00	5.57	5.46	39.18
1992	Avg Time (hrs.)	2.48	1.73	66.02	2.11	2.65	1.34	1.81	
	Freq.	20	28	47	57	71	32	40	
	Days per Year	2.07	2.02	129.29	5.01	7.84	1.79	3.02	151.03
1993	Avg Time (hrs.)	5.25	3.21	29.22	30.76	3.74	2.07	12.67	
	Freq.	4	6	51	58	48	34	46	
	Days per Year	0.88	0.80	62.09	74.34	67.48	49.93	74.28	329.80
1994	Avg Time (hrs.)	2.21	1.74	5.85	3.92	2.52	1.99	2.2	
	Freq.	42	38	26	55	55	48	27	
	Days per Year	3.87	2.76	6.34	8.98	5.78	3.98	2.48	34.17
1995	Avg Time (hrs.)	2.13	1.83	6.37	4.35	3.83	2.03	1.89	
	Freq.	18	46	65	42	106	65	59	
	Days per Year	1.60	3.51	17.25	7.61	16.92	5.50	4.65	57.03
1996	Avg Time (hrs.)	5.28	2.76	5.94	3.34	6.3	6.84	11.98	
	Freq.	62	61	51	58	60	48	50	
	Days per Year	13.64	7.02	12.62	8.07	15.75	13.68	24.96	95.74
1997	Avg Time (hrs.)	3.4	5.08	17.31	2.22	11.87	32.85	38.7	
	Freq.	47	34	31	54	75	27	35	
	Days per Year	6.66	7.20	22.36	5.00	37.09	36.96	56.44	171.70
1998	Avg Time (hrs.)	3.5	2.92	30.27	9.89	4.08	4.91	7.31	
	Freq.	11	21	65	75	55	22	75	
	Days per Year	1.60	2.56	81.98	30.91	9.35	4.50	22.84	153.74
1999	Avg Time (hrs.)	4.23	2.65	26.50	26.17	2.18	8.09	26.32	
	Freq.	47.00	43.00	61.00	60.00	49.00	24.00	58.00	
	Days per Year	8.28	4.75	67.35	65.43	4.45	8.09	63.61	221.96
	Avg. Days per year	4.34	3.54	41.49	22.16	18.59	14.26	29.78	

Since the new lockwalls will be the same height as the existing lockwalls, closures for high water will be similar to existing locks and therefore, these closures cannot be claimed as benefits. The closures due to high water must be subtracted from the closure data in Table 6. Peoria and LaGrange are wicket dams and navigation does not cease due to high water. During high flows the dam wickets are lowered and the dam has open pass. Therefore the locks are bypassed and high water does not create delays for navigation at Peoria and LaGrange. This data is not included in raw closure data for Peoria and LaGrange. For the Mississippi Locks, estimation of closures due to high water was based on information provided by the Operations Division of the Rock Island and St. Louis Districts. They examined their historical information for years 1994 to 1998 to give an estimation of closures per year due to high water. This information is show in Table 7 below.

**Table 7: Estimation Days of Navigation Lost Due to High Water.**

	L/D	LaGrange	Peoria	25	24	22	21	20
1990	Days Nav Stopped	0	0	0	0	0	0	4
1991	Days Nav Stopped	0	0	0.00	0.00	0	0	0
1992	Days Nav Stopped	0	0	0	0	0	0	0
1993	Days Nav Stopped	0	0	52.00	70.00	60	47	50
1994	Days Nav Stopped	0	0	0	0	0	0	0
1995	Days Nav Stopped	0	0	5.31	0.00	0	0	0
1996	Days Nav Stopped	0	0	7.42	0.75	7.88	8	7.46
1997	Days Nav Stopped	0	0	1.08	0.00	0	0	0
1998	Days Nav Stopped	0	0	2.04	3.54	3	3	4.38
1999	Days Nav Stopped	0	0	0.00	0.00	0	0	0.00

Discussions with the economic workgroup indicated that scheduled closures have different economic impact than unscheduled closures. The engineering work group attempted to separate the scheduled closures by examining the navigation notices for years 1990 to 1999. This effort yielded an estimation of scheduled closures each year and the data is presented in Table 8.

**Table 8: Scheduled Closure Data from Historical Navigation Notices**

	L/D	LaGrange	Peoria	25	24	22	21	20
1990	Days per Year	0.0	0.0	3.1	0.0	8.0	8.0	0.0
1991	Days per Year	0.0	0.0	2.0	17.8	1.8	1.8	0.0
1992	Days per Year	0.0	0.0	62.0	0.9	0.0	1.8	0.4
1993	Days per Year	0.0	0.0	0.1	0.0	0.0	0.0	0.0
1994	Days per Year	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1995	Days per Year	0.0	0.0	5.8	3.8	1.5	2.0	1.0
1996	Days per Year	2.0	3.0	0.0	0.0	1.3	0.9	1.0
1997	Days per Year	0.6	0.5	19.2	0.0	0.6	4.0	2.0
1998	Days per Year	0.0	0.0	61.4	2.8	0.0	0.0	0.0
1999	Days per Year	0.0	0.0	60.4	60.0	0.0	6.5	0.0
	Avg. Days per year	0.3	0.4	21.4	8.5	1.3	2.5	0.4

Subtracting the closure data in Table 7 and Table 8 from the raw data in Table 6 yields Table 9, an estimate of the average number days of unscheduled closures to navigation.

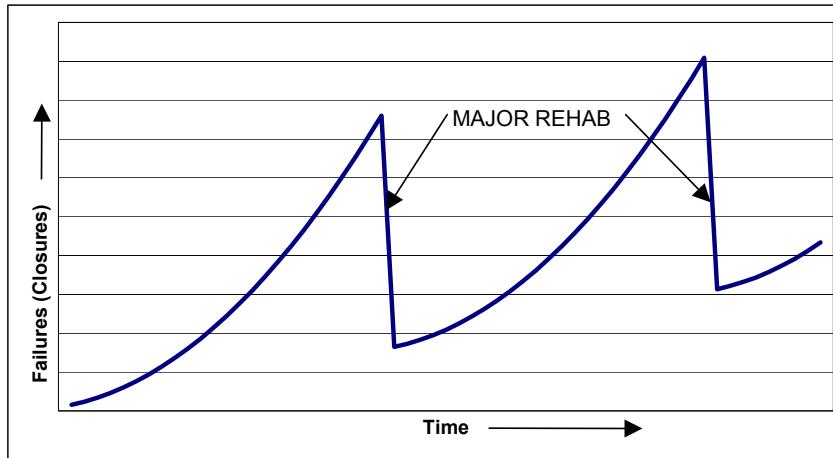
**Table 9: Unscheduled Closures**

	L/D	LaGrange	Peoria	25	24	22	21	20	Sum
1990	Days per Year	2.81	3.52	4.16	7.64	5.29	4.61	36.03	64.06
1991	Days per Year	2.00	1.25	6.25	-9.24	6.25	3.74	5.46	15.72
1992	Days per Year	2.07	2.02	67.33	4.12	7.84	0.00	2.64	86.01
1993	Days per Year	0.88	0.80	9.95	4.34	7.48	2.93	24.28	50.66
1994	Days per Year	3.87	2.76	6.34	8.98	5.78	3.98	2.48	34.17
1995	Days per Year	1.60	3.51	6.19	3.78	15.42	3.50	3.65	37.63
1996	Days per Year	11.64	4.02	5.21	7.32	6.55	4.76	16.50	55.99
1997	Days per Year	6.08	6.70	2.11	5.00	36.50	33.01	54.44	143.82
1998	Days per Year	1.60	2.56	18.56	24.53	6.35	1.50	18.47	73.57
1999	Days per Year	8.28	4.75	6.94	5.43	4.45	1.59	63.61	95.04
	Avg. Days per year	4.08	3.19	13.30	6.19	10.19	5.96	22.76	

To become useful for the system feasibility study this data must be projected into the future to estimate future redundancy benefits. Closures are primarily broken into two categories; unscheduled and scheduled. Unscheduled closures are random in nature can occur at any time. Schedule closures are generally planned and notice is given to industry. This allows industry to adjust its schedule to minimize the affects of the closure. Based on classical deterioration and rehabilitation curves, it is safe to say that unscheduled closure rates will increase with time, as structures become older. Scheduled closures are associated with major rehabilitation and cyclic maintenance.

When a structure receives a major rehabilitation it is safe to say that the structure's reliability will be significantly improved. Figure 1 shows a classical failure versus time curve. The drops are due to rehabilitation, which reduce the probability of failures. Using the historical data above, a curve of closure versus time was developed for each of the seven sites. Each curve is similar in shape to Figure 1.

The rehabilitation schedules are presented in Table 10. Each rehab is expected to restore 80% of the lock reliability at the beginning of the rehab cycle. This is based on Rock Island District's experience with lock closures and Major Rehab service life.



**Figure 1: Typical Deterioration Curve for Lock**

**Table 10: Scheduled Major Lock Rehabilitation (without project)**

Year	25	24	22	21	20
2010	-	-	-	-	-
2015	-	-	X	X	X
2020	X	X	-	-	-
2025	-	-	-	-	-
2030	-	-	-	-	-
2035	-	-	-	-	-
2040	-	-	X	X	X
2045	X	X	-	-	-
2050	-	-	-	-	-
2055	-	-	-	-	-
2060	-	-	-	-	-
2065	-	-	X	X	X

The rates of deterioration were adjusted to yield reasonable amounts of closure. It was assumed, as the closure rate became excessive, extraordinary measures would be taken to maintain operation. Attachment A presents the estimated closures per year for Locks 20-25, Peoria and LaGrange. The unscheduled closures are based on growth curves developed from the data in Table 9 and classical deterioration curves.

The cyclical closures are based on the navigation notice data presented in Table 8. These types of closures typically are between 12 and 72 hours in duration and are usually for gate and valve repair. Industry is notified in advance of the closures so that it may adjust for the upcoming closure. This closure data was not inflated in the future. The cyclic closure rates presented in Attachment A are averages based on years 1995 through 1998.

The major rehab closures are also scheduled in advance and industry is notified. The duration of these closures has historically been approximately 90 days in the Rock Island District. Future rehabs are scheduled as shown in Table 10. The expected service life a major rehab is assumed to be approximately 25 years.

The projected data is presented in Appendix B of this report. The tables contain the estimated amount of closures each year for years 2000 through 2065. Times are shown in days.

## **Staffing Requirements**

Assuming that features may be designed into the new lock to reduce the staff required to efficiently complete a lockage. By reducing staff by one person could reduce the amount of dollars needed to operate the lock. Such features include but are not limited to remote operation of lock components, and floating mooring bits. Remote operation would be accomplished by outfitting the lock controls to be operated from a handheld, or belt mounted device that the lockman would carry. This would eliminate the need for the lockman to return to operator panel to operate the equipment. Thus, allow him to complete other operations. Installing floating mooring bits would allow the deck hand to secure barges in the chamber without the aid of a lock man. With these improvements and possibly others, the number of required lockmen may be reduced.

If one lockman may be eliminated at each of the lower five sites, and each lockman cost approximately \$70,000. An estimated annual saving of \$350,000 could be realized

### Location 2

The savings at location 2 would be realized if the proposed concepts are incorporated into the final design. This reduces the amount of required people handling lockages.

### Location 3

At location 3, The savings would be realized if the existing lock is abandoned. If the existing lock is kept operational then additional personnel will be needed to staff both chambers. However, the increase would be smaller with the proposed concepts. Putting the lock into reserve status could reduce the lock staffing requirements however it is difficult to say whether the staffing reduction would be same as abandoning the existing lock, because maintenance will still be required at the existing lock.

## **Conclusions**

The information included herein was used as part of the development of the Engineering Appendix. The report s quantified concepts not previously considered in the plan formulation process. As the recommendations are refined and quantified, this information was used to fully understand the benefits and costs associated with large scale measures from an engineering prospective. This information was forwarded to the economic work group as part of the plan formulation process.

**Appendix A: Rehab Cost Avoidance Estimations: for Lock 20-25,  
Peoria and LaGrange**

## **Appendix A: Rehabilitation Cost Estimates**

**LOCK AND DAM NO. 25, LOCATION 2, TYPE R**  
**1200' LOCK ALTERNATIVE (SAND-FOUNDED)**

ITEM	QUANTITY	UNIT	New Lock		Stand Alone Rehabilitation of Existing Lock				Rehabilitation Items Eliminated By Lock Extension			
			('\$s')	AMOUNT (\$1,000's)	QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)	QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)
Interes	0.03											
<b>LANDS AND DAMAGES</b>												
REAL ESTATE	1	JOB	SUM	150								
DAMS												
<b>04 DAMS SUBTOTAL</b>				0								
<b>LOCKS</b>												
<b>SITEWORK</b>												
MOBILIZATION	1	JOB	SUM	8,650								
DEMOLITION	1	JOB	SUM	500								
EXCAVATION	6,000	CY	4.5	27								
SCOUR PROTECTION	2,000	TN	20	40								
FOUNDATION/LOCK Dewatering	1	JOB	SUM	3,000								
MARINE FACILITIES, TEMP MOORING STRUCTURE	1	JOB	SUM	950								
<b>SURVEY</b>												
SILT REMOVAL												
<b>CONCRETE</b>												
UNDERBASE GROUTING	2,200	CY	200	440								
CAST IN PLACE REINFORCED CONCRETE	12,191	CY	280	3,413								
VERTICAL CONCRETE REMOVAL/RESURFACING (INCL ARMOR)												
HORIZONTAL CONCRETE REMOVAL/RESURFACING												
4" SIDEWALK												
LIGHTWEIGHT CONCRETE	5,849	CY	325	1,901								
PRECAST CONCRETE	6,805	CY	400	2,722								
TREMIE CONCRETE	8,903	CY	165	1,469								
STONE FILL FOR IWALL CELLS	46,109	TN	20	922								
GROUT FOR STONE FILLED CELLS	5,056	CY	200	1,011								
SAND FILL FOR LANDWALL CELLS	22,601	CY	10.00	226								
FURNISH AND SET LANDING PADS	6	EA	19000	114								
FLOAT IN AND SET MITER GATE SILL	1	JOB	SUM	140								
36" DIA PIPE PILES, QTY 56 PILES	4,200	LF	350	1,470								
SET PRECAST WALL PANELS	48	EA	8000	384								
SET PRECAST BEAMS	50	EA	3000	150								
ARTICULATED CONCRETE MAT FOR FLOOR	70,000	SF	10	700								
BEDDING UNDER FLOOR MAT	7,000	TN	20	140								
CONCRETE REMOVAL												
POIREE DAM SILL												
COFFERDAM FOR POIREE DAM SILL												
<b>METALS</b>												
RIVER WALL SHEET PILING (PS-31)	110,854	SF	22.04	2,443								
STAY IN PLACE TEMPLATES	14	EA	50,000	700								
LANDWALL SHEET PILING (PS-31)	133,176	SF	19.64	2,616								
Z-PILE CRADLE FOR FOAT-IN MONOLITH	28,809	SF	21.74	626								
FOUNDATION PILING AND TESTING	1	JOB	SUM	1,000								
H-PILING HP 12X53	5,308	VLF	33.50	178								
STRUCTURAL STEEL (GATES, VALVES, TRASHRACKS)	1	JOB	SUM	4,211								
MITER GATES LEAVES												
MITER GATE REMOVAL/INSTALLATION												
MITER GATE ANCHOR BARS												
Refurbish Tainter Valves												
Tainter Valve Removal/Installation												
CULVERT INTAKES												
STRUCTURAL STEEL (MISCELLANEOUS - LADDERS, ETC.)	1	JOB	SUM	4,377								
ROCK BOLTS & SUPPORTS FOR PRECAST BEAMS	140	EA	350	49								
FASTNERS FOR PRECAST PANELS	336	EA	100	34								
CHECKPOST												
LOCK APPURTENANCES												
<b>ELECTRICAL</b>												
ELECTRICAL SYSTEM	1	JOB	SUM	4,700								
INSTRUMENTATION	1	JOB	SUM	1,250								
<b>MECHANICAL</b>												
GATE AND VALVE OPERATING MACHINERY	1	JOB	SUM	2,750								
MECHANICAL SYSTEMS	1	JOB	SUM	3,200								
Tainter Valve Machinery Refurbish												
Miter Gate Machinery Refurbish												
Bubble System												
<b>MISCELLANEOUS</b>												
Tainter Valve Trunnions												
Valve Sills												
Miter Gate Embedded Anchorages												
Pintles Replacement												
Miter Gate Sill Repair												
Control Booths												
Paving												
Utilities												
Temp Field Office												
Performance Bond												
<b>05 LOCKS SUBTOTAL</b>				58,453								
<b>GUIDEWALLS</b>												
<b>SITEWORK</b>												
EXCAVATION	118,490	CY	4.50	533								
BACKFILL	73,640	CY	10	736								
SCOUR PROTECTION	18,900	TN	20	378								
<b>CONCRETE</b>												
48" DIAMETER PILES	1035.96	VLF	370	383								
CAST IN PLACE CONCRETE	189	CY	280	53								
VERTICAL CONCRETE REMOVAL/RESURFACING (INCL ARMOR)												
HORIZONTAL CONCRETE REMOVAL/RESURFACING												
Joint Repairs Incl. Removal												
4" SIDEWALK												
MONOS 165, 166, 167, 1 & 64 Repair												
Lower Guidewall endcell repair												
PRESTRESSED BOX BEAMS	1	JOB	SUM	5,067								
PRECAST BEAM SEATS	6	EA	22,500	135								
TREMIE CONCRETE	90	CY	165	15								
PERMANENT CELL FILL(CONCRETE)	3,203	CY	200	641								
GROUT AND BLADDERS	5,328	CF	29.40	157								
STEEL REINFORCEMENT	150,350	LB	1	150								

**LOCK AND DAM 24 LOCATION 2, TYPE R  
1200' LOCK ALTERNATIVE (ROCK-FOUNDED)**

% Eliminated By Performing Lock Extensions = 0.81

**LOCK 22, LOCATION 2, TYPE R**  
**1200' LOCK ALTERNATIVE (ROCK-FOUNDED)**

ACCOUNT CODE	ITEM	New Lock				Stand Alone Rehabilitation of Existing Lock				Rehabilitation Items Avoided By Lock Extension			
		QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)	QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)	QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)
INTEREST RATE		0.03											
01.	LANDS AND DAMAGES												
	REAL ESTATE	1	JOB	SUM	150								
04.	DAMS				0								
	04 DAMS SUBTOTAL				0								
05.	LOCKS												
	SITEWORK												
	MOBILIZATION	1	JOB	SUM	8,000								
	DEMOLITION	1	JOB	SUM	500								
	ROCK EXCAVATION	8,247	CY	45	371								
	OVERBURDEN EXCAVATION	40,900	CY	4.5	184								
	BACKFILL	16,700	CY	10	167								
	LOCK Dewatering	1	JOB	SUM	1,250								
	MARINE FACILITIES, TEMP MOORING STRUCTURE	1	JOB	SUM	3,900								
	SURVEY												
	SILT/LOOSE ROCK REMOVAL												
	CONCRETE												
	UNDERBASE GROUTING	460	CY	200	92								
	CAST IN PLACE REINFORCED CONCRETE	18,533	CY	280	5,189								
	VERTICAL CONCRETE REMOVAL/RESURFACING (INC. ARMOR)												
	HORIZONTAL CONCRETE REMOVAL/RESURFACING												
	4" SIDEWALK												
	PRECAST CONCRETE	5,019	CY	400	2,008								
	GATE MONOLITH TREMIE CONCRETE	1,650	CY	210	347								
	CONCRETE CELL FILL	29,510	CY	200	5,902								
	FURNISH AND SET LANDING PADS	16	EA	19000	304								
	FLOAT IN AND SET MITER GATE SILL	4	EA	100000	400								
	SET PRECAST WALL PANELS	48	EA	8000	384								
	SET PRECAST BEAMS	50	EA	3000	150								
	ANCHORS FOR LANDWALL	1,875	EA	50	94								
	POIREE DAM SILL												
	COFFERDAM FOR POIREE DAM SILL												
	CONCRETE REMOVAL												
	METALS												
	RIVER WALL SHEET PILING (PS-31)	100,200	SF	22.04	2,208								
	STAY IN PLACE TEMPLATES	20	EA	50,000	1,000								
	STRUCTURAL STEEL (GATES, VALVES, TRASHRACKS)	1	JOB	SUM	4,200								
	MITER GATES LEAVES												
	MITER GATE REMOVAL/INSTALLATION												
	MITER GATE ANCHOR BARS												
	TANNER VALVES												
	TANNER VALVE REMOVAL/INSTALLATION												
	CULVERT INTAKES												
	STRUCTURAL STEEL (MISCELLANEOUS - LADDERS, ETC.)	1	JOB	SUM	3,040								
	ROCK BOLTS & SUPPORTS FOR PRECAST BEAMS	140	EA	350	49								
	FASTNERS FOR PRECAST PANELS	336	EA	100	34								
	HIGH CAPACITY ROCK ANCHORS	53	EA	8700	461								
	CHECKPOST												
	LOCK APPURTENANCES												
	ELECTRICAL												
	ELECTRICAL SYSTEM	1	JOB	SUM	4,700								
	METICAL												
	GATE AND VALVE OPERATING MACHINERY	1	JOB	SUM	2,750								
	MECHANICAL SYSTEMS	1	JOB	SUM	3,200								
	TANNER VALVE MACHINERY REFURBISH												
	MITER GATE MACHINERY REFURBISH												
	BUBBLER SYSTEM												
	MISCELLANEOUS	1	JOB	SUM	1,950								
	TANNER VALVE TRUNNIONS												
	VALVE SILLS												
	MITER GATE EMBEDDED ANCHORAGES												
	PINLES REPLACEMENT												
	MITER GATE SILL REPAIR												
	CONTROL BOOTHS												
	PAVING												
	UTILITIES												
	TEMP FIELD OFFICE												
	PERFORMANCE BOND												
	05 LOCKS SUBTOTAL				52,833								13758
05.60.	GUIDEWALLS												
	SITEWORK												
	ROCK EXCAVATION	210	CY	45.00	9								
	OVERBURDEN EXCAVATION	3060	CY	4.50	14								
	CONCRETE												
	CAST IN PLACE REINFORCED CONCRETE	500	CY	280	140								
	VERTICAL CONCRETE REMOVAL/RESURFACING (INC. ARMOR)												
	HORIZONTAL CONCRETE REMOVAL/RESURFACING												
	JOINT REPAIRS INC. REMOVAL												
	4" SIDEWALK												
	MONOS 1 & 64 REPAIR												
	PRECAST CONCRETE BEAMS (PRESTRESSED)	2,025	LF	2,000	4,050								
	TREMIE CONCRETE (WITH REINFORCEMENT)	2,515	CY	210	528								
	METALS												
	STEEL CYLINDERS FOR CELLS (FILLED W CONCRETE)	5	EA	450,000	2,250								
	NOSE STELL CYLINDER (FILLED WITH CONCRETE)	1	EA	900,000	900								
	ANCHOR BARS FOR BEAMS	2,010	LF	87.60	176								
	WALL ARMOR (14 STRIPS)	369,600	LB	4.20	1,552								
	STEEL RUB PLATE AND ACCESSORIES	63,600	LB	6.00	382								
	LADDERS AND MISC METALS	100,000	LB	3.00	300								
	HANDRAILING (ALUM.)	1,400	LF	125.40	176								
	CHECKPOST	30	EA	1,546.00	46								
	ACCESS HATCH	1	JOB	SUM	33								

**LOCK AND DAM NO. 21, LOCATION 2, TYPE R  
1200' LOCK ALTERNATIVE (SAND-FOUNDED)**

ITEM	QUANTITY	UNIT	New Lock		Stand Alone Rehabilitation of Existing Lock				Rehabilitation Items Eliminated By Lock Extension			
			(\$'s)	(\$1,000's)	QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)	QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)
Interest	0.03											
<b>LANDS AND DAMAGES</b>												
REAL ESTATE	1	JOB	SUM	150								
DAMS												
<b>04 DAMS SUBTOTAL</b>				0								
<b>LOCKS</b>												
<b>SITEWORK</b>												
MOBILIZATION	1	JOB	SUM	8,650								
DEMOLITION	1	JOB	SUM	500								
EXCAVATION	6,000	CY	4.5	27								
SCOUR PROTECTION	2,000	TN	20	40								
<i>FOUNDATION/LOCK Dewatering</i>	1	JOB	SUM	3,000								
MARINE FACILITIES, TEMP MOORING STRUCTURE	1	JOB	SUM	950								
<i>Survey</i>												
<i>Silt Removal</i>												
<b>CONCRETE</b>												
UNDERBASE GROUTING	2,200	CY	200	440								
CAST IN PLACE REINFORCED CONCRETE	12,191	CY	280	3,413								
<i>VERTICAL CONCRETE REMOVAL/RESURFACING (INCL ARMOR)</i>												
<i>HORIZONTAL CONCRETE REMOVAL/RESURFACING</i>												
<i>4" SIDEWALK</i>												
LIGHTWEIGHT CONCRETE	5,849	CY	325	1,901								
PRECAST CONCRETE	6,805	CY	400	2,722								
TREMIE CONCRETE	8,903	CY	165	1,469								
STONE FILL FOR IWALL CELLS	46,109	TN	20	922								
GROUT FOR STONE FILLED CELLS	5,056	CY	200	1,011								
SAND FILL FOR LANDWALL CELLS	22,601	CY	10.00	226								
FURNISH AND SET LANDING PADS	6	EA	19000	114								
FLOAT IN AND SET MITER GATE SILL	1	JOB	SUM	140								
36" DIA PIPE PILES, QTY 56 PILES	4,200	LF	350	1,470								
SET PRECAST WALL PANELS	48	EA	8000	384								
SET PRECAST BEAMS	50	EA	3000	150								
ARTICULATED CONCRETE MAT FOR FLOOR	70,000	SF	10	700								
BEDDING UNDER FLOOR MAT	7,000	TN	20	140								
CONCRETE REMOVAL												
<i>POIRET DAM SILL</i>												
<i>COFFERDAM FOR POIRET DAM SILL</i>												
<b>METALS</b>												
RIVER WALL SHEET PILING (PS-31)	110,854	SF	22.04	2,443								
STAY IN PLACE TEMPLATES	14	EA	50,000	700								
LANDWALL SHEET PILING (PS-31)	133,176	SF	19.64	2,616								
Z-PILE CRADLE FOR FOAT-IN MONOLITH	28,809	SF	21.74	626								
FOUNDATION PILING AND TESTING	1	JOB	SUM	1,000								
H-PILING HP 12X53	5,308	VLF	33.50	178								
STRUCTURAL STEEL (GATES, VALVES, TRASHRACKS)	1	JOB	SUM	4,211								
<i>MITER GATES LEAVES</i>												
<i>MITER GATE REMOVAL/INSTALLATION</i>												
<i>MITER GATE ANCHOR BARS</i>												
<i>Tainter Valves</i>												
<i>Tainter Valve Removal/Installation</i>												
<i>CULVERT INTAKES</i>												
STRUCTURAL STEEL (MISCELLANEOUS - LADDERS, ETC.)	1	JOB	SUM	4,377								
ROCK BOLTS & SUPPORTS FOR PRECAST BEAMS	140	EA	350	49								
FASTNERS FOR PRECAST PANELS	336	EA	100	34								
<b>ELECTRICAL</b>												
ELECTRICAL SYSTEM	1	JOB	SUM	4,700								
INSTRUMENTATION	1	JOB	SUM	1,250								
<b>MECHANICAL</b>												
GATE AND VALVE OPERATING MACHINERY	1	JOB	SUM	2,750								
MECHANICAL SYSTEMS	1	JOB	SUM	3,200								
<i>Tainter Valve Machinery Refurbish</i>												
<i>MITER GATE MACHINERY REFURBISH</i>												
<i>BUBBLER SYSTEM</i>												
<b>MISCELLANEOUS</b>												
<i>Tainter Valve Trunnions</i>												
<i>Valve Sills</i>												
<i>MITER GATE EMBEDDED ANCHORAGES</i>												
<i>Pintles Replacement</i>												
<i>MITER GATE SILL REPAIR</i>												
<i>CONTROL BOOTHS</i>												
<i>PAVING</i>												
<i>UTILITIES</i>												
<i>TEMP FIELD OFFICE</i>												
<i>Performance Bond</i>												
<b>05 LOCKS SUBTOTAL</b>				58,453					20847			14572
<b>GUIDEWALLS</b>												
<b>SITEWORK</b>												
EXCAVATION	118,490	CY	4.50	533								
BACKFILL	73,640	CY	10	736								
SCOUR PROTECTION	18,900	TN	20	378								
<b>CONCRETE</b>												
48" DIAMETER PILES	1035.96	VLF	370	383								
CAST IN PLACE CONCRETE	189	CY	280	53								
<i>Vertical Concrete Removal/Resurfacing (Incl Armor)</i>												
<i>Horizontal Concrete Removal/Resurfacing</i>												
<i>Joint Repairs Incl. Removal</i>												
<i>4" SIDEWALK</i>												
<i>MONOS 1 &amp; 64 REPAIR</i>												
PRESTRESSED BOX BEAMS	1	JOB	SUM	5,067								
PRECAST BEAM SEATS	6	EA	22,500	135								
TREMIE CONCRETE	90	CY	165	15								
PERMANENT CELL FILL(CONCRETE)	3,203	CY	200	641								
GROUT AND BLADDERS	5,328	CF	29.40	157								
STEEL REINFORCEMENT	150,350	LB	1	150								
STONE FILL FOR WALL CELLS	8,706	CY	20	174								
<b>METALS</b>					</td							

**LOCK 20, LOCATION 2, TYPE R  
1200' LOCK ALTERNATIVE (ROCK-FOUNDED)**

**REHAB COSTS PEORIA LOCK AND DAM,  
LOCATION 1, TYPE C  
1200' LOCK ALTERNATIVE (SAND-FOUNDED)**

ITEM	0.03	Stand Alone Rehabilitation of Existing Lock				Rehabilitation Items Eliminated By Lock Extension				
		QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)	QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)	
LANDS AND DAMAGES										
REAL ESTATE										
DAMS										
04 DAMS SUBTOTAL										
LOCKS										
SITEWORK										
MOBILIZATION		1	JOB	98,509.31	99					
FOUNDATION/LOCK Dewatering		1	JOB	SUM	1200					
SURVEY		1	JOB	\$23,635.69	24					
SILT REMOVAL		100	CY	\$117.27	12					
CONCRETE										
VERTICAL CONCRETE REMOVAL/RESURFACING (INCL ARMOR)		400	CY	\$3,860.57	1544					
HORIZONTAL CONCRETE REMOVAL/RESURFACING		300	CY	\$1,406.89	422					
4" SIDEWALK		25	CY	\$587.11	15					
POIREE DAM SILL		1	JOB	\$434,905.35	435					
COFFERDAM FOR POIREE DAM SILL		1	JOB	\$1,186,203.40	1186					
METALS										
MITER GATES LEAVES		4	EA	\$990,048.46	3960					
MITER GATE REMOVAL/INSTALLATION		4	EA	\$39,970.90	160					
MITER GATE ANCHOR BARS		4	EA	\$63,309.87	253					
TAINER VALVES		4	EA	\$110,799.34	443					
TAINER VALVE REMOVAL/INSTALLATION		4	EA	\$12,298.74	49					
CULVERT INTAKES		1	JOB	\$114,801.90	115					
CHECKPOST		54	EA	\$4,391.74	237					
LOCK APPURTENANCES		1	EA	\$168,826.32	169					
ELECTRICAL										
ELECTRICAL SYSTEM		1	JOB	\$2,813,772.03	2814					
MECHANICAL										
HYDRAULIC REPLACEMENT		1	LS	\$5,000,000	482					
BUBBLER SYSTEM		1	JOB	\$123,867.98	124					
MISCELLANEOUS										
TAINER VALVE TRUNNIONS		4	EA	\$27,500.00	110					
VALVE SILLS		4	EA	\$32,500.00	130					
MITER GATE EMBEDDED ANCHORAGES		4	EA	\$27,500.00	110					
PINTLES REPLACEMENT		4	EA	\$104,539.28	418					
MITER GATE SILL REPAIR		2	EA	\$260,733.26	521					
CONTROL BOOTHS		4	EA	\$15,855.04	63					
PAVING		1	JOB	\$128,856.95	129					
UTILITIES		1	JOB	\$227,622.73	228					
TEMP FIELD OFFICE		1	JOB	\$56,275.44	56					
PERFORMANCE BOND		1	JOB	\$230,000.00	230					
05 LOCKS SUBTOTAL						15738				
GUIDEWALLS										
SITEWORK										
EXCAVATION		236980	CY	4.50	1,066	236980	CY	4.50	1,066	
BACKFILL		147280	CY	10	1,473	147280	CY	10	1,473	
SCOUR PROTECTION		37800	TN	20	756	37800	TN	20	756	
CONCRETE										
48" DIAMETER PILES		2136	VLF	370	790	2136	VLF	370	790	
CAST IN PLACE CONCRETE		390	CY	280	109	390	CY	280	109	
PRESTRESSED BOX BEAMS		1	JOB	SUM	10,134	1	JOB	SUM	10,134	
PRECAST BEAM SEATS		12	EA	22,500	270	12	EA	22,500	270	
TREMIE CONCRETE		180	CY	165	30	180	CY	165	30	
PERMANENT CELL FILL(CONCRETE)		6,604	CY	200	1,321	6,604	CY	200	1,321	
GROUT AND BLADDERS		10,656	CF	29.40	313	10,656	CF	29.40	313	
STEEL REINFORCEMENT		155,000	LB	1	155	155,000	LB	1	155	
STONE FILL FOR WALL CELLS		17,950	CY	20	359	17,950	CY	20	359	
METALS										
STEEL SHEET PILING FOR CELLS (PS-31)		124,080	SF	22.04	2,735	124,080	SF	22.04	2,735	
STEEL SHEET PILING FOR SKIRT		58,320	SF	18.35	1,070	58,320	SF	18.35	1,070	
STEEL H-PILING (FOR 57 FT DIA CELL)		8,160	VLF	52.50	428	8,160	VLF	52.50	428	
ANCHOR BARS FOR BEAMS		4,320	LF	87.60	378	4,320	LF	87.60	378	
WALL ARMOR (14 STRIPS)		739,200	LB	4.20	3,105	739,200	LB	4.20	3,105	
STEEL RUB PLATE AND ACCESSORIES		127,200	LB	6.00	763	127,200	LB	6.00	763	
LADDERS AND MISC METALS		200,000	LB	3.00	600	200,000	LB	3.00	600	
HANDRAILLING (ALUM.)		2,800	LF	125.40	351	2,800	LF	125.40	351	
CHECKPOST		60	EA	1,546	93	60	EA	1,546	93	
ACCESS HATCHES		1	JOB	SUM	66	1	JOB	SUM	66	
ELECTRICAL										
ELECTRICAL SYSTEM		1	JOB	SUM	156	1	JOB	SUM	156	
05.60 GUIDEWALLS SUBTOTAL						26,522				
CHANNEL WORK										
PROJECT SUBTOTAL						42260				
CONTINGENCIES 25%						10565				
PROJECT SUBTOTAL WITH CONTINGENCIES						52824				
PLANNING, ENGINEERING, AND DESIGN (10%)						5282				
CONSTRUCTION MANAGEMENT (10%)						5282				
PROJECT TOTAL						\$ 63,389				

**REHAB COSTS LAGRANGE LOCK AND DAM,  
LOCATION 1, TYPE C  
1200' LOCK ALTERNATIVE (SAND-FOUNDED)**

ITEM	0.03	Stand Alone Rehabilitation of Existing Lock				Rehabilitation Items Eliminated By Lock Extension				
		QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)	QUANTITY	UNIT	UNIT PRICE (\$'s)	AMOUNT (\$1,000's)	
LANDS AND DAMAGES										
REAL ESTATE										
DAMS										
04 DAMS SUBTOTAL										
LOCKS										
SITEWORK										
MOBILIZATION		1	JOB	98,509.31	99					
FOUNDATION/LOCK Dewatering		1	JOB	SUM	1200					
SURVEY		1	JOB	\$23,635.69	24					
SILT REMOVAL		100	CY	\$117.27	12					
CONCRETE										
VERTICAL CONCRETE REMOVAL/RESURFACING (INCL ARMOR)		1,504	CY	\$3,860.57	5806					
HORIZONTAL CONCRETE REMOVAL/RESURFACING		300	CY	\$1,406.89	422					
4" SIDEWALK		25	CY	\$587.11	15					
POIREE DAM SILL		1	JOB	\$434,905.35	435					
COFFERDAM FOR POIREE DAM SILL		1	JOB	\$1,186,203.40	1186					
METALS										
MITER GATES LEAVES		4	EA	\$990,048.46	3960					
MITER GATE REMOVAL/INSTALLATION		4	EA	\$39,970.90	160					
MITER GATE ANCHOR BARS		4	EA	\$63,309.87	253					
TAINER VALVES		4	EA	\$110,799.34	443					
TAINER VALVE REMOVAL/INSTALLATION		4	EA	\$12,298.74	49					
CULVERT INTAKES		1	JOB	\$114,801.90	115					
CHECKPOST		54	EA	\$4,391.74	237					
LOCK APPURTENANCES		1	EA	\$168,826.32	169					
ELECTRICAL										
ELECTRICAL SYSTEM		1	JOB	\$2,813,772.03	2814					
MECHANICAL										
HYDRAULIC REPLACEMENT		1	LS	\$5,000,000	482					
BUBBLER SYSTEM		1	JOB	\$123,867.98	124					
MISCELLANEOUS										
TAINER VALVE TRUNNIONS		4	EA	\$27,500.00	110					
VALVE SILLS		4	EA	\$32,500.00	130					
MITER GATE EMBEDDED ANCHORAGES		4	EA	\$27,500.00	110					
PINTLES REPLACEMENT		4	EA	\$104,539.28	418					
MITER GATE SILL REPAIR		2	EA	\$260,733.26	521					
CONTROL BOOTHS		4	EA	\$15,855.04	63					
PAVING		1	JOB	\$128,856.95	129					
UTILITIES		1	JOB	\$227,622.73	228					
TEMP FIELD OFFICE		1	JOB	\$56,275.44	56					
PERFORMANCE BOND		1	JOB	\$230,000.00	230					
05 LOCKS SUBTOTAL						20000				
GUIDEWALLS										
SITEWORK										
EXCAVATION		236980	CY	4.50	1,066	236980	CY	4.50	1,066	
BACKFILL		147280	CY	10	1,473	147280	CY	10	1,473	
SCOUR PROTECTION		37800	TN	20	756	37800	TN	20	756	
CONCRETE										
48" DIAMETER PILES		2136	VLF	370	790	2136	VLF	370	790	
CAST IN PLACE CONCRETE		390	CY	280	109	390	CY	280	109	
PRESTRESSED BOX BEAMS		1	JOB	SUM	10,134	1	JOB	SUM	10,134	
PRECAST BEAM SEATS		12	EA	22,500	270	12	EA	22,500	270	
TREMIE CONCRETE		180	CY	165	30	180	CY	165	30	
PERMANENT CELL FILL(CONCRETE)		6,604	CY	200	1,321	6,604	CY	200	1,321	
GROUT AND BLADDERS		10,656	CF	29.40	313	10,656	CF	29.40	313	
STEEL REINFORCEMENT		155,000	LB	1	155	155,000	LB	1	155	
STONE FILL FOR WALL CELLS		17,950	CY	20	359	17,950	CY	20	359	
METALS										
STEEL SHEET PILING FOR CELLS (PS-31)		124,080	SF	22.04	2,735	124,080	SF	22.04	2,735	
STEEL SHEET PILING FOR SKIRT		58,320	SF	18.35	1,070	58,320	SF	18.35	1,070	
STEEL H-PILING (FOR 57 FT DIA CELL)		8,160	VLF	52.50	428	8,160	VLF	52.50	428	
ANCHOR BARS FOR BEAMS		4,320	LF	87.60	378	4,320	LF	87.60	378	
WALL ARMOR (14 STRIPS)		739,200	LB	4.20	3,105	739,200	LB	4.20	3,105	
STEEL RUB PLATE AND ACCESSORIES		127,200	LB	6.00	763	127,200	LB	6.00	763	
LADDERS AND MISC METALS		200,000	LB	3.00	600	200,000	LB	3.00	600	
HANDRAILLING (ALUM.)		2,800	LF	125.40	351	2,800	LF	125.40	351	
CHECKPOST		60	EA	1,546	93	60	EA	1,546	93	
ACCESS HATCHES		1	JOB	SUM	66	1	JOB	SUM	66	
ELECTRICAL										
ELECTRICAL SYSTEM		1	JOB	SUM	156	1	JOB	SUM	156	
05.60 GUIDEWALLS SUBTOTAL						26,522				
CHANNEL WORK										
PROJECT SUBTOTAL						46522				
CONTINGENCIES 25%						11630				
PROJECT SUBTOTAL WITH CONTINGENCIES						58152				
PLANNING, ENGINEERING, AND DESIGN (10%)						5815				
CONSTRUCTION MANAGEMENT (10%)						5815				
PROJECT TOTAL						\$ 69,782				

## **Appendix B: Estimation of Navigation Cycles without Project**

Predicted Cycles at Lock 25 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	Remarks
1940	1,570,167	1,478		1,478	1,478	
1941	1,974,121	1,594		1,594	3,071	
1942	1,987,289	1,597		1,597	4,669	
1943	1,608,788	1,489		1,489	6,158	
1944	1,875,881	1,565		1,565	7,723	
1945	2,033,557	1,611		1,611	9,334	
1946	2,989,198	1,885		1,885	11,219	
1947	3,120,342	1,923		1,923	13,142	
1948	3,252,308	1,961		1,961	15,102	
1949	3,654,954	2,076		2,076	17,178	
1950	4,323,837	2,268		2,268	19,446	
1951	4,225,148	2,240		2,240	21,686	
1952	4,044,774	2,188		2,188	23,874	
1953	5,072,640	2,483		2,483	26,357	
1954	5,675,246	2,656		2,656	29,013	
1955	6,530,038	2,901		2,901	31,914	
1956	6,792,648	2,977		2,977	34,891	
1957	7,460,929	3,168		3,168	38,059	
1958	8,464,618	3,456		3,456	41,516	
1959	9,154,872	3,655		3,655	45,170	
1960	9,686,116	3,807		3,807	48,977	
1961	9,762,011	3,829		3,829	52,806	
1962	10,814,046	4,131		4,131	56,937	
1963	12,599,623	4,643		4,643	61,580	
1964	13,408,798	4,875		4,875	66,455	
1965	13,425,723	4,880		4,880	71,336	
1966	15,857,490	5,578		5,578	76,914	
1967	16,355,932	5,721		5,721	82,635	
1968	16,547,642	5,776		5,776	88,412	
1969	18,622,522	6,372		6,372	94,783	
1970	22,175,609	7,392		7,392	102,175	
1971	21,430,888	7,178		7,178	109,353	
1972	24,611,927	8,091		8,091	117,443	
1973	22,706,350	7,544		7,544	124,987	
1974	24,292,547	7,999		7,999	132,986	
1975	23,712,446	7,833		7,833	140,819	
1976	24,781,578	8,139		8,139	148,958	
1977	25,093,200	8,229		8,229	157,187	
1978	29,041,957	9,362		9,362	166,549	
1979	28,638,386	9,246		9,246	175,796	Estimated Cycles 1940 -1979
1980	32,737,870	11,116		11,116	186,912	
1981	34,230,487	11,731		11,731	198,643	
1982	32,767,055	10,895		10,895	209,538	
1983	37,439,016	12,498		12,498	222,036	
1984	36,167,255	11,606		11,606	233,642	
1985	26,109,104	8,770		8,770	242,412	
1986	28,159,960	9,246		9,246	251,658	
1987	35,319,224	11,133		11,133	262,791	
1988	37,875,033	12,107		12,107	274,898	
1989	36,218,686	11,703		11,703	286,601	
1990	42,339,143	13,223		13,223	299,824	
1991	37,501,847	12,169		12,169	311,993	
1992	39,378,151	12,235		12,235	324,228	
1993	26,560,658	8,025		8,025	332,253	
1994	30,758,651	9,218		9,218	341,471	

Predicted Cycles at Lock 25 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	Remarks
1995	37,434,409		11,279	11,279	352,750	Major Rehab at 25
1996	36,088,709		11,247	11,247	11,247	
1997	33,638,634		10,220	10,220	21,467	
1998	34,819,845		10,150	10,150	31,617	
1999	39,536,830		11,312	11,312	42,929	Actual Cycle from 1996-1999
2000	42,910,000	13,342		13,342	56,271	
2001	43,094,600	13,395		13,395	69,667	
2002	43,279,200	13,448		13,448	83,115	
2003	43,463,800	13,501		13,501	96,616	
2004	43,648,400	13,554		13,554	110,170	
2005	43,833,000	13,607		13,607	123,777	
2006	43,901,000	13,627		13,627	137,404	
2007	43,969,000	13,646		13,646	151,050	
2008	44,037,000	13,666		13,666	164,716	
2009	44,105,000	13,685		13,685	178,401	
2010	44,173,000	13,705		13,705	192,106	
2011	44,213,400	13,716		13,716	205,822	
2012	44,253,800	13,728		13,728	219,550	
2013	44,294,200	13,740		13,740	233,290	
2014	44,334,600	13,751		13,751	247,041	
2015	44,375,000	13,763		13,763	260,804	
2016	44,449,400	13,784		13,784	274,588	
2017	44,523,800	13,805		13,805	288,393	
2018	44,598,200	13,827		13,827	302,220	
2019	44,672,600	13,848		13,848	316,068	
2020	44,747,000	13,870		13,870	329,938	
2021	44,802,400	13,885		13,885	343,823	
2022	44,857,800	13,901		13,901	357,725	Major Rehab at 25
2023	44,913,200	13,917		13,917	13,917	
2024	44,968,600	13,933		13,933	27,850	
2025	45,024,000	13,949		13,949	41,799	
2026	45,079,400	13,965		13,965	55,764	
2027	45,134,800	13,981		13,981	69,745	
2028	45,190,200	13,997		13,997	83,742	
2029	45,245,600	14,013		14,013	97,754	
2030	45,301,000	14,029		14,029	111,783	
2031	45,350,700	14,043		14,043	125,826	
2032	45,400,400	14,057		14,057	139,883	
2033	45,450,100	14,071		14,071	153,954	
2034	45,499,800	14,086		14,086	168,040	
2035	45,549,500	14,100		14,100	182,139	
2036	45,599,200	14,114		14,114	196,253	
2037	45,648,900	14,128		14,128	210,382	
2038	45,698,600	14,143		14,143	224,524	
2039	45,748,300	14,157		14,157	238,681	
2040	45,798,000	14,171		14,171	252,852	
2041	45,843,800	14,184		14,184	267,037	
2042	45,889,600	14,197		14,197	281,234	
2043	45,935,400	14,211		14,211	295,445	
2044	45,981,200	14,224		14,224	309,668	
2045	46,027,000	14,237		14,237	323,905	
2046	46,072,800	14,250		14,250	338,155	
2047	46,118,600	14,263		14,263	352,418	
2048	46,164,400	14,276		14,276	366,695	Major Rehab at 25
2049	46,210,200	14,289		14,289	14,289	
2050	46,256,000	14,303		14,303	28,592	

Predicted Cycles at Lock 24 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	Remarks
1940	1,578,624	1,101		1,101	1,101	
1941	1,975,878	1,215		1,215	2,315	
1942	1,968,734	1,213		1,213	3,528	
1943	1,669,539	1,127		1,127	4,654	
1944	1,878,299	1,187		1,187	5,841	
1945	2,029,925	1,230		1,230	7,071	
1946	2,977,872	1,502		1,502	8,573	
1947	3,149,689	1,551		1,551	10,125	
1948	3,224,357	1,573		1,573	11,698	
1949	3,645,372	1,694		1,694	13,392	
1950	4,305,665	1,883		1,883	15,275	
1951	4,199,346	1,853		1,853	17,128	
1952	4,042,095	1,808		1,808	18,935	
1953	5,053,533	2,098		2,098	21,033	
1954	5,649,694	2,269		2,269	23,302	
1955	6,505,230	2,515		2,515	25,817	
1956	6,783,763	2,594		2,594	28,411	
1957	7,437,070	2,782		2,782	31,193	
1958	8,446,256	3,072		3,072	34,265	
1959	9,180,898	3,282		3,282	37,547	
1960	9,711,261	3,435		3,435	40,982	
1961	9,638,452	3,414		3,414	44,396	
1962	10,865,245	3,766		3,766	48,161	
1963	12,611,627	4,267		4,267	52,428	
1964	13,312,470	4,468		4,468	56,897	
1965	13,521,270	4,528		4,528	61,425	
1966	15,915,016	5,215		5,215	66,640	
1967	16,312,126	5,329		5,329	71,969	
1968	16,663,104	5,430		5,430	77,399	
1969	18,371,594	5,920		5,920	83,319	
1970	22,209,505	7,022		7,022	90,341	
1971	21,563,788	6,836		6,836	97,177	
1972	24,941,149	7,806		7,806	104,983	
1973	22,940,935	7,232		7,232	112,214	
1974	24,522,995	7,686		7,686	119,900	
1975	23,713,451	7,453		7,453	127,353	
1976	24,588,373	7,704		7,704	135,058	
1977	25,057,500	7,839		7,839	142,897	
1978	28,928,612	8,950		8,950	151,847	
<b>1979</b>	<b>28,562,788</b>	<b>8,845</b>		<b>8,845</b>	<b>160,692</b>	<b>Estimated Cycles 1940-1979</b>
1980	32,749,649	10,837		10,837	171,529	
1981	33,908,995	11,270		11,270	182,799	
1982	32,763,728	10,507		10,507	193,306	
1983	37,345,441	12,164		12,164	205,470	
1984	35,962,865	11,051		11,051	216,521	
1985	26,101,054	8,361		8,361	224,882	
1986	28,162,425	8,617		8,617	233,499	
1987	35,313,874	10,800		10,800	244,299	
1988	37,885,828	11,681		11,681	255,980	
1989	36,137,676	11,171		11,171	267,151	
1990	42,352,920	12,968		12,968	280,119	
1991	37,341,861	11,453		11,453	291,572	
1992	39,423,782	11,922		11,922	303,494	
1993	26,581,272	8,010		8,010	311,504	
1994	30,735,288	8,772		8,772	320,276	
<b>1995</b>	<b>37,542,028</b>	<b>11,118</b>		<b>11,118</b>	<b>331,394</b>	<b>Major Rehab 24</b>

Predicted Cycles at Lock 24 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	Remarks
1996	36,181,599		11,075	11,075	11,075	
1997	33,614,530		9,851	9,851	20,926	
1998	34,747,480		9,734	9,734	30,660	
<b>1999</b>	<b>39,296,994</b>		<b>10,958</b>	<b>10,958</b>	<b>41,618</b>	<b>Actual Cycles 1996-1999</b>
2000	42,910,000	12,963	12,963	54,581		
2001	43,094,600	13,016	13,016	67,596		
2002	43,279,200	13,069	13,069	80,665		
2003	43,463,800	13,122	13,122	93,787		
2004	43,648,400	13,175	13,175	106,961		
2005	43,833,000	13,228	13,228	120,189		
2006	43,901,000	13,247	13,247	133,436		
2007	43,969,000	13,267	13,267	146,703		
2008	44,037,000	13,286	13,286	159,989		
2009	44,105,000	13,306	13,306	173,295		
2010	44,173,000	13,325	13,325	186,620		
2011	44,213,400	13,337	13,337	199,956		
2012	44,253,800	13,348	13,348	213,305		
2013	44,294,200	13,360	13,360	226,665		
2014	44,334,600	13,372	13,372	240,036		
2015	44,375,000	13,383	13,383	253,420		
2016	44,449,400	13,405	13,405	266,824		
2017	44,523,800	13,426	13,426	280,250		
2018	44,598,200	13,447	13,447	293,697		
2019	44,672,600	13,469	13,469	307,166		
2020	44,747,000	13,490	13,490	320,656		
<b>2021</b>	<b>44,802,400</b>	<b>13,506</b>	<b>13,506</b>	<b>334,161</b>		<b>Major Rehab 24</b>
2022	44,857,800	13,522	13,522	13,522		
2023	44,913,200	13,538	13,538	27,059		
2024	44,968,600	13,554	13,554	40,613		
2025	45,024,000	13,569	13,569	54,182		
2026	45,079,400	13,585	13,585	67,768		
2027	45,134,800	13,601	13,601	81,369		
2028	45,190,200	13,617	13,617	94,986		
2029	45,245,600	13,633	13,633	108,619		
2030	45,301,000	13,649	13,649	122,268		
2031	45,350,700	13,663	13,663	135,931		
2032	45,400,400	13,677	13,677	149,609		
2033	45,450,100	13,692	13,692	163,300		
2034	45,499,800	13,706	13,706	177,006		
2035	45,549,500	13,720	13,720	190,726		
2036	45,599,200	13,735	13,735	204,461		
2037	45,648,900	13,749	13,749	218,210		
2038	45,698,600	13,763	13,763	231,973		
2039	45,748,300	13,777	13,777	245,750		
2040	45,798,000	13,792	13,792	259,542		
2041	45,843,800	13,805	13,805	273,346		
2042	45,889,600	13,818	13,818	287,164		
2043	45,935,400	13,831	13,831	300,995		
2044	45,981,200	13,844	13,844	314,839		
2045	46,027,000	13,857	13,857	328,697		
<b>2046</b>	<b>46,072,800</b>	<b>13,870</b>	<b>13,870</b>	<b>342,567</b>		<b>Major Rehab 24</b>
2047	46,118,600	13,884	13,884	13,884		
2048	46,164,400	13,897	13,897	27,780		
2049	46,210,200	13,910	13,910	41,690		
2050	46,256,000	13,923	13,923	55,613		

Predicted Cycles at Lock 22 without Large Scale Improvements					
Without Large Scale Improvements					
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	3,257,156	1,743	1,743	1,743	
1949	3,657,908	1,856	1,856	3,600	
1950	4,489,750	2,091	2,091	5,691	
1951	4,193,536	2,008	2,008	7,699	
1952	4,029,761	1,961	1,961	9,660	
1953	5,099,453	2,263	2,263	11,923	
1954	5,637,586	2,415	2,415	14,338	
1955	6,528,046	2,666	2,666	17,004	
1956	6,761,730	2,732	2,732	19,735	
1957	7,389,315	2,909	2,909	22,644	
1958	8,424,138	3,201	3,201	25,845	
1959	9,131,161	3,400	3,400	29,245	
1960	9,543,754	3,516	3,516	32,761	
1961	9,630,482	3,541	3,541	36,302	
1962	10,798,255	3,870	3,870	40,172	
1963	12,571,123	4,370	4,370	44,542	
1964	13,149,196	4,533	4,533	49,075	
1965	13,292,429	4,573	4,573	53,648	
1966	15,665,875	5,243	5,243	58,891	
1967	16,010,320	5,340	5,340	64,231	
1968	16,253,642	5,408	5,408	69,639	
1969	18,062,328	5,919	5,919	75,558	
1970	21,262,240	6,821	6,821	82,379	
1971	20,703,681	6,663	6,663	89,042	
1972	23,605,632	7,482	7,482	96,524	
1973	21,782,904	6,968	6,968	103,492	
1974	23,591,920	7,478	7,478	110,970	
1975	22,999,712	7,311	7,311	118,280	
1976	24,016,384	7,598	7,598	125,878	
1977	24,257,539	7,666	7,666	133,544	
1978	27,755,051	8,652	8,652	142,196	
<b>1979</b>	<b>27,384,670</b>	<b>8,547</b>	<b>8,547</b>	<b>150,743</b>	<b>Estimated Cycles 1940-1979</b>
1980	31,492,337	10,510	10,510	161,253	
1981	32,849,454	11,080	11,080	172,333	
1982	30,236,481	10,067	10,067	182,400	
1983	36,353,436	11,900	11,900	194,300	
1984	34,599,589	10,768	10,768	205,068	
1985	25,074,264	7,905	7,905	212,973	
1986	26,869,965	8,363	8,363	221,336	
1987	34,210,177	10,470	10,470	231,806	
1988	36,775,468	11,273	11,273	243,079	
1989	34,937,546	11,206	11,206	254,285	
<b>1990</b>	<b>41,352,068</b>	<b>12,269</b>	<b>12,269</b>	<b>266,554</b>	<b>Major Rehab at 22</b>
1991	36,552,707	11,143	11,143	11,143	
1992	38,286,421	11,306	11,306	22,449	
1993	25,207,186	7,400	7,400	29,849	
1994	29,410,587	8,261	8,261	38,110	
1995	36,045,081	10,795	10,795	48,905	
1996	34,832,298	10,672	10,672	59,577	
1997	32,296,553	9,493	9,493	69,070	
1998	33,648,345	9,501	9,501	78,571	
<b>1999</b>	<b>38,074,304</b>	<b>10,711</b>	<b>10,711</b>	<b>89,282</b>	<b>Actual Cycle From 1991-1999</b>

Predicted Cycles at Lock 22 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
2000	41,865,000	12,631		12,631	101,913	
2001	42,045,200	12,682		12,682	114,595	
2002	42,225,400	12,733		12,733	127,327	
2003	42,405,600	12,783		12,783	140,110	
2004	42,585,800	12,834		12,834	152,945	
2005	42,766,000	12,885		12,885	165,830	
2006	42,829,400	12,903		12,903	178,732	
2007	42,892,800	12,921		12,921	191,653	
2008	42,956,200	12,939		12,939	204,592	
2009	43,019,600	12,956		12,956	217,548	
2010	43,083,000	12,974		12,974	230,523	
2011	43,122,400	12,985		12,985	243,508	
2012	43,161,800	12,997		12,997	256,505	
<b>2013</b>	<b>43,201,200</b>	<b>13,008</b>		<b>13,008</b>	<b>269,512</b>	<b>Major Rehab at 22</b>
2014	43,240,600	13,019		13,019	13,019	
2015	43,280,000	13,030		13,030	26,049	
2016	43,352,800	13,050		13,050	39,099	
2017	43,425,600	13,071		13,071	52,170	
2018	43,498,400	13,092		13,092	65,262	
2019	43,571,200	13,112		13,112	78,374	
2020	43,644,000	13,133		13,133	91,506	
2021	43,699,000	13,148		13,148	104,654	
2022	43,754,000	13,164		13,164	117,818	
2023	43,809,000	13,179		13,179	130,997	
2024	43,864,000	13,195		13,195	144,192	
2025	43,919,000	13,210		13,210	157,402	
2026	43,974,000	13,226		13,226	170,627	
2027	44,029,000	13,241		13,241	183,869	
2028	44,084,000	13,257		13,257	197,125	
2029	44,139,000	13,272		13,272	210,397	
2030	44,194,000	13,288		13,288	223,685	
2031	44,246,000	13,302		13,302	236,987	
2032	44,298,000	13,317		13,317	250,304	
2033	44,350,000	13,332		13,332	263,636	
<b>2034</b>	<b>44,402,000</b>	<b>13,346</b>		<b>13,346</b>	<b>276,982</b>	<b>Major Rehab at 22</b>
2035	44,454,000	13,361		13,361	13,361	
2036	44,506,000	13,376		13,376	26,737	
2037	44,558,000	13,390		13,390	40,127	
2038	44,610,000	13,405		13,405	53,532	
2039	44,662,000	13,420		13,420	66,952	
2040	44,714,000	13,434		13,434	80,386	
2041	44,768,100	13,450		13,450	93,835	
2042	44,822,200	13,465		13,465	107,300	
2043	44,876,300	13,480		13,480	120,780	
2044	44,930,400	13,495		13,495	134,276	
2045	44,984,500	13,511		13,511	147,786	
2046	45,038,600	13,526		13,526	161,312	
2047	45,092,700	13,541		13,541	174,853	
2048	45,146,800	13,556		13,556	188,410	
2049	45,200,900	13,572		13,572	201,981	
2050	45,255,000	13,587		13,587	215,568	

Predicted Cycles at Lock 21 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
1948	3,250,277	2,092		2,092	2,092	
1949	3,657,394	2,204		2,204	4,297	
1950	4,324,869	2,388		2,388	6,685	
1951	4,198,771	2,353		2,353	9,038	
1952	3,959,722	2,287		2,287	11,325	
1953	4,993,949	2,572		2,572	13,897	
1954	5,629,351	2,747		2,747	16,644	
1955	6,547,665	2,999		2,999	19,643	
1956	6,732,733	3,050		3,050	22,693	
1957	7,301,966	3,207		3,207	25,900	
1958	8,360,266	3,498		3,498	29,397	
1959	8,965,200	3,664		3,664	33,061	
1960	9,475,607	3,804		3,804	36,866	
1961	9,503,880	3,812		3,812	40,678	
1962	10,525,620	4,093		4,093	44,771	
1963	12,176,529	4,547		4,547	49,318	
1964	12,682,446	4,686		4,686	54,004	
1965	12,944,194	4,758		4,758	58,763	
1966	15,632,206	5,497		5,497	64,260	
1967	15,794,893	5,542		5,542	69,802	
1968	15,808,599	5,546		5,546	75,348	
1969	17,721,553	6,072		6,072	81,420	
1970	20,880,065	6,941		6,941	88,361	
1971	20,170,528	6,745		6,745	95,106	
1972	22,956,367	7,512		7,512	102,618	
1973	21,301,967	7,057		7,057	109,674	
1974	22,971,936	7,516		7,516	117,190	
1975	22,344,001	7,343		7,343	124,533	
1976	23,421,529	7,639		7,639	132,173	
1977	23,875,803	7,764		7,764	139,937	
1978	27,230,772	8,687		8,687	148,624	
<b>1979</b>	<b>26,857,573</b>	<b>8,584</b>		<b>8,584</b>	<b>157,209</b>	<b>Estimated Cycles 1940-1979</b>
1980	30,934,381	10,449		10,449	167,658	
1981	32,386,232	11,119		11,119	178,777	
1982	29,634,611	9,924		9,924	188,701	
1983	35,809,671	11,841		11,841	200,542	
1984	33,981,587	10,606		10,606	211,148	
1985	24,418,332	7,997		7,997	219,145	
1986	26,038,524	8,267		8,267	227,412	
1987	33,383,266	10,280		10,280	237,692	
1988	36,138,068	11,192		11,192	248,884	
1989	34,362,226	10,824		10,824	259,708	
<b>1990</b>	<b>40,848,768</b>	<b>12,288</b>		<b>12,288</b>	<b>271,996</b>	<b>Major Rehab at 21</b>
1991	36,129,597	11,095		11,095	11,095	
1992	37,942,533	11,467		11,467	22,562	
1993	24,762,903	7,475		7,475	30,037	
1994	28,778,306	8,501		8,501	38,538	
1995	35,347,635	10,774		10,774	49,312	
1996	34,494,594	10,696		10,696	60,008	
1997	31,908,064	9,590		9,590	69,598	
1998	33,312,353	9,715		9,715	79,313	
<b>1999</b>	<b>37,863,139</b>	<b>10,931</b>		<b>10,931</b>	<b>90,244</b>	<b>Actual Cycle from 1991-1999</b>

Predicted Cycles at Lock 21 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
2000	41,105,000	12,502		12,502	102,746	
2001	41,281,600	12,551		12,551	115,297	
2002	41,458,200	12,600		12,600	127,897	
2003	41,634,800	12,648		12,648	140,545	
2004	41,811,400	12,697		12,697	153,242	
2005	41,988,000	12,745		12,745	165,987	
2006	42,047,400	12,762		12,762	178,749	
2007	42,106,800	12,778		12,778	191,527	
2008	42,166,200	12,794		12,794	204,321	
2009	42,225,600	12,811		12,811	217,132	
2010	42,285,000	12,827		12,827	229,958	
2011	42,323,200	12,837		12,837	242,796	
2012	42,361,400	12,848		12,848	255,644	
<b>2013</b>	<b>42,399,600</b>	<b>12,858</b>		<b>12,858</b>	<b>268,502</b>	<b>Major Rehab at 21</b>
2014	42,437,800	12,869		12,869	12,869	
2015	42,476,000	12,879		12,879	25,748	
2016	42,547,200	12,899		12,899	38,647	
2017	42,618,400	12,919		12,919	51,566	
2018	42,689,600	12,938		12,938	64,504	
2019	42,760,800	12,958		12,958	77,462	
2020	42,832,000	12,977		12,977	90,439	
2021	42,885,400	12,992		12,992	103,432	
2022	42,938,800	13,007		13,007	116,438	
2023	42,992,200	13,021		13,021	129,460	
2024	43,045,600	13,036		13,036	142,496	
2025	43,099,000	13,051		13,051	155,547	
2026	43,152,400	13,065		13,065	168,612	
2027	43,205,800	13,080		13,080	181,692	
2028	43,259,200	13,095		13,095	194,787	
2029	43,312,600	13,110		13,110	207,897	
2030	43,366,000	13,124		13,124	221,021	
2031	43,416,700	13,138		13,138	234,159	
2032	43,467,400	13,152		13,152	247,311	
2033	43,518,100	13,166		13,166	260,477	
<b>2034</b>	<b>43,568,800</b>	<b>13,180</b>		<b>13,180</b>	<b>273,657</b>	<b>Major Rehab at 21</b>
2035	43,619,500	13,194		13,194	13,194	
2036	43,670,200	13,208		13,208	26,402	
2037	43,720,900	13,222		13,222	39,624	
2038	43,771,600	13,236		13,236	52,859	
2039	43,822,300	13,250		13,250	66,109	
2040	43,873,000	13,264		13,264	79,373	
2041	43,925,800	13,278		13,278	92,651	
2042	43,978,600	13,293		13,293	105,944	
2043	44,031,400	13,307		13,307	119,251	
2044	44,084,200	13,322		13,322	132,572	
2045	44,137,000	13,336		13,336	145,909	
2046	44,189,800	13,351		13,351	159,259	
2047	44,242,600	13,365		13,365	172,625	
2048	44,295,400	13,380		13,380	186,005	
2049	44,348,200	13,394		13,394	199,399	
2050	44,401,000	13,409		13,409	212,808	

Predicted Cycles at Lock 20 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CCYLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
1948	3,216,586	2,283		2,283	2,283	
1949	3,599,981	2,386		2,386	4,669	
1950	4,256,999	2,563		2,563	7,231	
1951	4,123,491	2,527		2,527	9,758	
1952	3,881,537	2,462		2,462	12,220	
1953	4,829,604	2,717		2,717	14,936	
1954	5,478,073	2,891		2,891	17,827	
1955	6,323,748	3,119		3,119	20,946	
1956	6,541,991	3,177		3,177	24,123	
1957	7,112,616	3,331		3,331	27,454	
1958	8,109,287	3,599		3,599	31,053	
1959	8,629,438	3,739		3,739	34,792	
1960	9,274,687	3,912		3,912	38,704	
1961	9,108,352	3,868		3,868	42,572	
1962	10,022,014	4,113		4,113	46,685	
1963	11,766,146	4,583		4,583	51,267	
1964	12,336,595	4,736		4,736	56,003	
1965	12,613,811	4,811		4,811	60,814	
1966	15,192,291	5,504		5,504	66,318	
1967	15,317,958	5,538		5,538	71,856	
1968	15,346,251	5,546		5,546	77,402	
1969	17,291,642	6,069		6,069	83,471	
1970	20,356,285	6,893		6,893	90,364	
1971	19,592,226	6,688		6,688	97,052	
1972	22,380,283	7,438		7,438	104,490	
1973	20,779,467	7,007		7,007	111,497	
1974	22,310,205	7,419		7,419	118,916	
1975	21,698,943	7,254		7,254	126,170	
1976	22,459,494	7,459		7,459	133,629	
1977	22,970,560	7,597		7,597	141,226	
1978	26,229,107	8,473		8,473	149,699	
<b>1979</b>	<b>25,429,839</b>	<b>8,258</b>		<b>8,258</b>	<b>157,957</b>	<b>Estimated Cycles 1940-1979</b>
1980	29,753,810	10,094		10,094	168,051	
1981	31,563,357	10,953		10,953	179,004	
1982	28,693,805	9,783		9,783	188,787	
1983	35,001,990	11,460		11,460	200,247	
1984	32,961,468	10,173		10,173	210,420	
1985	23,663,845	7,767		7,767	218,187	
1986	24,855,394	7,618		7,618	225,805	
1987	31,943,807	10,685		10,685	236,490	
1988	34,891,573	10,745		10,745	247,235	
1989	33,524,054	10,592		10,592	257,827	
<b>1990</b>	<b>39,789,475</b>	<b>11,527</b>		<b>11,527</b>	<b>269,354</b>	<b>Major Rehab at 20</b>
1991	35,063,100	10,809		10,809	10,809	
1992	36,614,710	11,176		11,176	21,985	
1993	23,345,464	7,245		7,245	29,230	
1994	27,441,221	8,306		8,306	37,536	
1995	34,309,031	10,533		10,533	48,069	
1996	33,147,979	10,376		10,376	58,445	
1997	30,354,110	9,258		9,258	67,703	
1998	31,745,410	9,362		9,362	77,065	
<b>1999</b>	<b>36,512,515</b>	<b>10,615</b>		<b>10,615</b>	<b>87,680</b>	<b>Actual Cycle From 1991-1999</b>

Predicted Cycles at Lock 20 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CCYLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
2000	39,873,000	12,143		12,143	99,823	
2001	40,049,600	12,191		12,191	112,014	
2002	40,226,200	12,238		12,238	124,252	
2003	40,402,800	12,286		12,286	136,538	
2004	40,579,400	12,333		12,333	148,872	
2005	40,756,000	12,381		12,381	161,252	
2006	40,813,200	12,396		12,396	173,649	
2007	40,870,400	12,412		12,412	186,060	
2008	40,927,600	12,427		12,427	198,487	
2009	40,984,800	12,442		12,442	210,930	
2010	41,042,000	12,458		12,458	223,387	
2011	41,082,200	12,469		12,469	235,856	
2012	41,122,400	12,479		12,479	248,335	
2013	41,162,600	12,490		12,490	260,826	
<b>2014</b>	<b>41,202,800</b>	<b>12,501</b>		<b>12,501</b>	<b>273,327</b>	<b>Major Rehab at 20</b>
2015	41,243,000	12,512		12,512	12,512	
2016	41,316,400	12,532		12,532	25,043	
2017	41,389,800	12,551		12,551	37,595	
2018	41,463,200	12,571		12,571	50,166	
2019	41,536,600	12,591		12,591	62,757	
2020	41,610,000	12,611		12,611	75,367	
2021	41,666,400	12,626		12,626	87,993	
2022	41,722,800	12,641		12,641	100,634	
2023	41,779,200	12,656		12,656	113,290	
2024	41,835,600	12,671		12,671	125,961	
2025	41,892,000	12,686		12,686	138,648	
2026	41,948,400	12,702		12,702	151,349	
2027	42,004,800	12,717		12,717	164,066	
2028	42,061,200	12,732		12,732	176,798	
2029	42,117,600	12,747		12,747	189,545	
2030	42,174,000	12,762		12,762	202,307	
2031	42,227,100	12,777		12,777	215,084	
2032	42,280,200	12,791		12,791	227,875	
2033	42,333,300	12,805		12,805	240,680	
2034	42,336,400	12,806		12,806	253,486	
<b>2035</b>	<b>42,439,500</b>	<b>12,834</b>		<b>12,834</b>	<b>266,320</b>	<b>Major Rehab at 20</b>
2036	42,492,600	12,848		12,848	12,848	
2037	42,545,700	12,862		12,862	25,710	
2038	42,598,800	12,877		12,877	38,587	
2039	42,651,900	12,891		12,891	51,478	
2040	42,705,000	12,905		12,905	64,383	
2041	42,762,500	12,921		12,921	77,303	
2042	42,820,000	12,936		12,936	90,239	
2043	42,877,500	12,952		12,952	103,191	
2044	42,935,000	12,967		12,967	116,158	
2045	42,992,500	12,982		12,982	129,140	
2046	43,050,000	12,998		12,998	142,138	
2047	43,107,500	13,013		13,013	155,152	
2048	43,165,000	13,029		13,029	168,181	
2049	43,222,500	13,044		13,044	181,225	
2050	43,280,000	13,060		13,060	194,285	

Predicted Cycles at Lock 19 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
1948	3,131,156	1,408		1,408	1,408	
1949	3,514,072	1,459		1,459	2,867	
1950	4,117,866	1,539		1,539	4,407	
1951	4,075,251	1,534		1,534	5,940	
1952	3,734,104	1,488		1,488	7,429	
1953	4,723,961	1,620		1,620	9,049	
1954	5,238,070	1,688		1,688	10,737	
1955	6,361,861	1,838		1,838	12,575	
1956	6,287,118	1,828		1,828	14,403	
1957	6,837,249	1,901		1,901	16,304	
1958	7,862,064	2,037		2,037	18,341	
1959	8,354,552	2,103		2,103	20,444	
1960	8,877,604	2,172		2,172	22,617	
1961	8,806,417	2,163		2,163	24,780	
1962	9,700,344	2,282		2,282	27,062	
1963	11,472,629	2,518		2,518	29,579	
1964	11,985,112	2,586		2,586	32,165	
1965	12,299,235	2,628		2,628	34,792	
1966	14,840,092	2,965		2,965	37,758	
1967	14,993,832	2,986		2,986	40,744	
1968	14,864,151	2,969		2,969	43,712	
1969	16,953,697	3,247		3,247	46,959	
1970	20,029,663	3,656		3,656	50,615	
1971	19,232,733	3,550		3,550	54,164	
1972	22,043,136	3,923		3,923	58,088	
1973	20,339,357	3,697		3,697	61,785	
1974	21,693,445	3,877		3,877	65,662	
1975	21,153,249	3,805		3,805	69,467	
1976	21,938,042	3,909		3,909	73,376	
1977	22,958,987	4,045		4,045	77,421	
1978	25,598,071	4,396		4,396	81,818	
<b>1979</b>	<b>24,909,291</b>	<b>4,305</b>		<b>4,305</b>	<b>86,122</b>	<b>Estimated Cycles 1940-1979</b>
1980	29,067,375	5,244		5,244	91,366	
1981	30,965,730	5,689		5,689	97,055	
1982	27,879,923	5,043		5,043	102,098	
1983	34,625,457	5,677		5,677	107,775	
1984	32,317,898	5,099		5,099	112,874	
1985	23,424,209	4,168		4,168	117,042	
1986	24,289,929	4,162		4,162	121,204	
1987	31,218,384	5,111		5,111	126,315	
1988	33,903,408	5,599		5,599	131,914	
1989	32,908,351	5,615		5,615	137,529	
1990	39,153,123	5,946		5,946	143,475	
1991	34,410,147	5,835		5,835	149,310	
1992	35,982,699	5,730		5,730	155,040	
1993	22,775,079	3,573		3,573	158,613	
1994	26,677,268	4,318		4,318	162,931	
1995	33,195,954	5,242		5,242	168,173	
1996	32,335,946	5,331		5,331	173,504	
1997	29,623,384	4,858		4,858	178,362	
1998	31,076,726	4,919		4,919	183,281	
<b>1999</b>	<b>35,803,139</b>	<b>5,354</b>		<b>5,354</b>	<b>188,635</b>	<b>Actual Cycle From 1980-1999</b>

Predicted Cycles at Lock 19 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
2000	39,017,000	6,181		6,181	194,816	
2001	39,184,600	6,203		6,203	201,020	
2002	39,352,200	6,226		6,226	207,245	
2003	39,519,800	6,248		6,248	213,493	
2004	39,687,400	6,270		6,270	219,763	
<b>2005</b>	<b>39,855,000</b>	<b>6,292</b>		<b>6,292</b>	<b>226,056</b>	<b>Major Rehab at 19</b>
2006	39,905,400	6,299		6,299	6,299	
2007	39,955,800	6,306		6,306	12,605	
2008	40,006,200	6,313		6,313	18,918	
2009	40,056,600	6,319		6,319	25,237	
2010	40,107,000	6,326		6,326	31,563	
2011	40,143,200	6,331		6,331	37,894	
2012	40,179,400	6,336		6,336	44,229	
2013	40,215,600	6,340		6,340	50,569	
2014	40,251,800	6,345		6,345	56,915	
2015	40,288,000	6,350		6,350	63,265	
2016	40,356,000	6,359		6,359	69,624	
2017	40,424,000	6,368		6,368	75,992	
2018	40,492,000	6,377		6,377	82,369	
2019	40,560,000	6,386		6,386	88,755	
2020	40,628,000	6,395		6,395	95,151	
2021	40,679,700	6,402		6,402	101,553	
2022	40,731,400	6,409		6,409	107,962	
2023	40,783,100	6,416		6,416	114,378	
2024	40,834,800	6,423		6,423	120,800	
2025	40,886,500	6,430		6,430	127,230	
2026	40,938,200	6,437		6,437	133,666	
2027	40,989,900	6,443		6,443	140,110	
2028	41,041,600	6,450		6,450	146,560	
2029	41,093,300	6,457		6,457	153,017	
2030	41,145,000	6,464		6,464	159,481	
2031	41,193,400	6,470		6,470	165,952	
2032	41,241,800	6,477		6,477	172,428	
2033	41,290,200	6,483		6,483	178,912	
2034	41,338,600	6,490		6,490	185,402	
2035	41,387,000	6,496		6,496	191,898	
2036	41,435,400	6,503		6,503	198,400	
2037	41,483,800	6,509		6,509	204,909	
2038	41,532,200	6,516		6,516	211,425	
2039	41,580,600	6,522		6,522	217,947	
2040	41,629,000	6,528		6,528	224,475	
<b>2041</b>	<b>41,681,700</b>	<b>6,535</b>		<b>6,535</b>	<b>231,011</b>	<b>Major Rehab at 19</b>
2042	41,734,400	6,542		6,542	237,553	
2043	41,787,100	6,549		6,549	6,549	
2044	41,839,800	6,556		6,556	13,106	
2045	41,892,500	6,563		6,563	19,669	
2046	41,945,200	6,570		6,570	26,240	
2047	41,997,900	6,577		6,577	32,817	
2048	42,050,600	6,584		6,584	39,402	
2049	42,103,300	6,591		6,591	45,993	
2050	42,156,000	6,598		6,598	52,592	

Predicted Cycles at Lock 18 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
1948	3,142,588	2,182		2,182	2,182	
1949	3,469,566	2,275		2,275	4,457	
1950	4,073,232	2,446		2,446	6,903	
1951	4,037,546	2,436		2,436	9,339	
1952	3,699,126	2,340		2,340	11,678	
1953	4,617,063	2,600		2,600	14,278	
1954	5,160,505	2,753		2,753	17,031	
1955	6,304,890	3,077		3,077	20,109	
1956	6,246,516	3,061		3,061	23,170	
1957	6,782,677	3,212		3,212	26,382	
1958	7,715,088	3,476		3,476	29,858	
1959	8,191,968	3,611		3,611	33,470	
1960	8,790,394	3,781		3,781	37,250	
1961	8,641,432	3,739		3,739	40,989	
1962	9,630,450	4,018		4,018	45,007	
1963	11,020,329	4,412		4,412	49,419	
1964	11,378,333	4,513		4,513	53,932	
1965	11,560,909	4,565		4,565	58,497	
1966	14,011,410	5,258		5,258	63,755	
1967	14,264,898	5,330		5,330	69,085	
1968	13,816,766	5,203		5,203	74,288	
1969	15,869,262	5,784		5,784	80,072	
1970	18,701,125	6,585		6,585	86,658	
1971	17,783,930	6,326		6,326	92,984	
1972	19,978,774	6,947		6,947	99,930	
1973	18,310,452	6,475		6,475	106,405	
1974	20,018,100	6,958		6,958	113,363	
1975	19,472,413	6,804		6,804	120,167	
1976	20,060,099	6,970		6,970	127,137	
1977	20,796,353	7,178		7,178	134,316	
1978	23,246,775	7,872		7,872	142,187	
<b>1979</b>	<b>22,994,081</b>	<b>7,800</b>		<b>7,800</b>	<b>149,988</b>	<b>Estimated Cycles 1940-1979</b>
1980	27,255,792	9,441		9,441	159,429	
1981	29,277,166	10,592		10,592	170,021	
1982	27,136,988	9,651		9,651	179,672	
1983	34,160,853	11,492		11,492	191,164	
1984	30,099,277	9,961		9,961	201,125	
1985	22,294,829	7,779		7,779	208,904	
1986	23,114,990	7,738		7,738	216,642	
1987	29,841,560	9,919		9,919	226,561	
1988	32,232,509	10,875		10,875	237,436	
1989	31,370,442	10,641		10,641	248,077	
1990	37,729,279	11,540		11,540	259,617	
1991	32,703,896	10,311		10,311	269,928	
1992	33,942,692	10,481		10,481	280,409	
1993	21,225,959	6,392		6,392	286,801	
1994	25,144,787	8,008		8,008	294,809	
<b>1995</b>	<b>31,507,495</b>	<b>10,171</b>		<b>10,171</b>	<b>304,980</b>	<b>Major Rehab at 18</b>
1996	31,766,629	10,204		10,204	10,204	
1997	28,791,241	9,216		9,216	19,420	
1998	31,228,140	9,573		9,573	28,993	
<b>1999</b>	<b>35,707,505</b>	<b>10,889</b>		<b>10,889</b>	<b>39,882</b>	<b>Actual Cycle from 1996-1999</b>

Predicted Cycles at Lock 18 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
2000	36,798,000	11,707		11,707	51,589	
2001	36,940,600	11,747		11,747	63,336	
2002	37,083,200	11,788		11,788	75,124	
2003	37,225,800	11,828		11,828	86,951	
2004	37,368,400	11,868		11,868	98,820	
2005	37,511,000	11,909		11,909	110,728	
2006	37,539,400	11,917		11,917	122,645	
2007	37,567,800	11,925		11,925	134,570	
2008	37,596,200	11,933		11,933	146,502	
2009	37,624,600	11,941		11,941	158,443	
2010	37,653,000	11,949		11,949	170,392	
2011	37,674,200	11,955		11,955	182,347	
2012	37,695,400	11,961		11,961	194,308	
2013	37,716,600	11,967		11,967	206,274	
2014	37,737,800	11,973		11,973	218,247	
2015	37,759,000	11,979		11,979	230,226	
2016	37,817,600	11,995		11,995	242,221	
2017	37,876,200	12,012		12,012	254,233	
2018	37,934,800	12,029		12,029	266,262	
2019	37,993,400	12,045		12,045	278,307	
2020	38,052,000	12,062		12,062	290,369	
<b>2021</b>	<b>38,094,200</b>	<b>12,074</b>		<b>12,074</b>	<b>302,442</b>	<b>Major Rehab at 18</b>
2022	38,136,400	12,086		12,086	12,086	
2023	38,178,600	12,098		12,098	24,183	
2024	38,220,800	12,109		12,109	36,293	
2025	38,263,000	12,121		12,121	48,414	
2026	38,305,200	12,133		12,133	60,547	
2027	38,347,400	12,145		12,145	72,693	
2028	38,389,600	12,157		12,157	84,850	
2029	38,431,800	12,169		12,169	97,019	
2030	38,474,000	12,181		12,181	109,200	
2031	38,514,600	12,193		12,193	121,393	
2032	38,555,200	12,204		12,204	133,597	
2033	38,595,800	12,216		12,216	145,813	
2034	38,636,400	12,227		12,227	158,040	
2035	38,677,000	12,239		12,239	170,278	
2036	38,717,600	12,250		12,250	182,528	
2037	38,758,200	12,262		12,262	194,790	
2038	38,798,800	12,273		12,273	207,063	
2039	38,839,400	12,285		12,285	219,348	
2040	38,880,000	12,296		12,296	231,644	
2041	38,923,700	12,308		12,308	243,952	
2042	38,967,400	12,321		12,321	256,273	
2043	39,011,100	12,333		12,333	268,606	
2044	39,054,800	12,346		12,346	280,952	
2045	39,098,500	12,358		12,358	293,309	
<b>2046</b>	<b>39,142,200</b>	<b>12,370</b>		<b>12,370</b>	<b>305,680</b>	<b>Major Rehab at 18</b>
2047	39,185,900	12,383		12,383	12,383	
2048	39,229,600	12,395		12,395	24,778	
2049	39,273,300	12,407		12,407	37,185	
2050	39,317,000	12,420		12,420	49,605	

Predicted Cycles at Lock 17 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
1948	3,140,904	2,120		2,120	2,120	
1949	3,477,893	2,212		2,212	4,332	
1950	4,046,442	2,366		2,366	6,698	
1951	4,003,977	2,354		2,354	9,052	
1952	3,658,761	2,261		2,261	11,312	
1953	4,582,666	2,511		2,511	13,823	
1954	5,112,167	2,654		2,654	16,478	
1955	6,289,579	2,974		2,974	19,451	
1956	6,232,861	2,958		2,958	22,410	
1957	6,684,067	3,080		3,080	25,490	
1958	7,572,454	3,321		3,321	28,811	
1959	7,998,234	3,437		3,437	32,248	
1960	8,692,694	3,625		3,625	35,873	
1961	8,565,102	3,590		3,590	39,463	
1962	9,316,470	3,794		3,794	43,257	
1963	10,772,663	4,188		4,188	47,445	
1964	10,903,333	4,224		4,224	51,669	
1965	11,146,484	4,290		4,290	55,959	
1966	13,581,871	4,950		4,950	60,909	
1967	13,846,768	5,022		5,022	65,930	
1968	13,454,216	4,915		4,915	70,846	
1969	15,595,107	5,495		5,495	76,341	
1970	18,397,510	6,255		6,255	82,596	
1971	17,546,911	6,024		6,024	88,620	
1972	19,350,409	6,513		6,513	95,133	
1973	17,933,697	6,129		6,129	101,262	
1974	19,887,070	6,658		6,658	107,921	
1975	19,107,453	6,447		6,447	114,368	
1976	19,420,055	6,532		6,532	120,900	
1977	20,249,573	6,757		6,757	127,657	
1978	22,701,236	7,421		7,421	135,078	
<b>1979</b>	<b>22,293,116</b>	<b>7,311</b>		<b>7,311</b>	<b>142,388</b>	<b>Estimated Cycles 1940-1979</b>
1980	26,361,211	9,389		9,389	151,777	
1981	28,389,794	10,122		10,122	161,899	
1982	26,180,221	9,278		9,278	171,177	
1983	33,479,331	10,905		10,905	182,082	
1984	29,377,017	9,244		9,244	191,326	
1985	21,812,672	7,193		7,193	198,519	
1986	22,604,590	7,064		7,064	205,583	
1987	29,226,120	9,473		9,473	215,056	
1988	31,448,709	10,230		10,230	225,286	
1989	30,857,392	9,850		9,850	235,136	
1990	37,316,583	10,925		10,925	246,061	
1991	32,513,260	9,790		9,790	255,851	
1992	33,279,329	9,955		9,955	265,806	
1993	20,530,312	6,066		6,066	271,872	
1994	24,481,119	7,207		7,207	279,079	
<b>1995</b>	<b>30,513,874</b>	<b>9,451</b>		<b>9,451</b>	<b>288,530</b>	<b>Major Rehab at 17</b>
1996	30,942,140	9,625		9,625	9,625	
1997	27,915,871	8,356		8,356	17,981	
1998	30,015,252	8,717		8,717	26,698	
<b>1999</b>	<b>34,170,210</b>	<b>9,865</b>		<b>9,865</b>	<b>36,563</b>	<b>Actual Cycle from 1996-1999</b>

Predicted Cycles at Lock 17 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
2000	35,988,000	11,022		11,022	47,585	
2001	36,120,000	11,058		11,058	58,642	
2002	36,252,000	11,093		11,093	69,736	
2003	36,384,000	11,129		11,129	80,865	
2004	36,516,000	11,165		11,165	92,030	
2005	36,648,000	11,201		11,201	103,231	
2006	36,667,800	11,206		11,206	114,437	
2007	36,687,600	11,211		11,211	125,648	
2008	36,707,400	11,217		11,217	136,865	
2009	36,727,200	11,222		11,222	148,087	
2010	36,747,000	11,228		11,228	159,315	
2011	36,762,600	11,232		11,232	170,546	
2012	36,778,200	11,236		11,236	181,782	
2013	36,793,800	11,240		11,240	193,023	
2014	36,809,400	11,244		11,244	204,267	
2015	36,825,000	11,249		11,249	215,516	
2016	36,878,400	11,263		11,263	226,779	
2017	36,931,800	11,278		11,278	238,056	
2018	36,985,200	11,292		11,292	249,349	
2019	37,038,600	11,307		11,307	260,655	
2020	37,092,000	11,321		11,321	271,976	
<b>2021</b>	<b>37,129,200</b>	<b>11,331</b>		<b>11,331</b>	<b>283,307</b>	<b>Major Rehab at 17</b>
2022	37,166,400	11,341		11,341	11,341	
2023	37,203,600	11,351		11,351	22,692	
2024	37,240,800	11,361		11,361	34,054	
2025	37,278,000	11,371		11,371	45,425	
2026	37,315,200	11,382		11,382	56,807	
2027	37,352,400	11,392		11,392	68,198	
2028	37,389,600	11,402		11,402	79,600	
2029	37,426,800	11,412		11,412	91,012	
2030	37,464,000	11,422		11,422	102,434	
2031	37,499,400	11,431		11,431	113,865	
2032	37,534,800	11,441		11,441	125,306	
2033	37,570,200	11,451		11,451	136,757	
2034	37,605,600	11,460		11,460	148,217	
2035	37,641,000	11,470		11,470	159,687	
2036	37,676,400	11,479		11,479	171,166	
2037	37,711,800	11,489		11,489	182,655	
2038	37,747,200	11,499		11,499	194,154	
2039	37,782,600	11,508		11,508	205,662	
2040	37,818,000	11,518		11,518	217,180	
2041	37,856,700	11,528		11,528	228,708	
2042	37,895,400	11,539		11,539	240,247	
2043	37,934,100	11,549		11,549	251,796	
2044	37,972,800	11,560		11,560	263,356	
2045	38,011,500	11,570		11,570	274,926	
<b>2046</b>	<b>38,050,200</b>	<b>11,581</b>		<b>11,581</b>	<b>286,507</b>	<b>Major Rehab at 17</b>
2047	38,088,900	11,591		11,591	11,591	
2048	38,127,600	11,602		11,602	23,193	
2049	38,166,300	11,612		11,612	34,805	
2050	38,205,000	11,623		11,623	46,428	

Predicted Cycles at Lock 16 without Large Scale Improvements					
Without Large Scale Improvements					
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	3,114,731	2,693	2,693	2,693	
1949	3,439,972	2,784	2,784	5,477	
1950	4,008,822	2,944	2,944	8,420	
1951	4,061,294	2,959	2,959	11,379	
1952	3,677,407	2,851	2,851	14,230	
1953	4,258,150	3,014	3,014	17,244	
1954	5,057,671	3,239	3,239	20,482	
1955	6,100,510	3,532	3,532	24,014	
1956	6,188,635	3,556	3,556	27,570	
1957	6,623,098	3,678	3,678	31,249	
1958	7,437,979	3,907	3,907	35,156	
1959	7,916,704	4,042	4,042	39,198	
1960	8,669,087	4,253	4,253	43,452	
1961	8,432,267	4,187	4,187	47,638	
1962	9,193,312	4,401	4,401	52,039	
1963	10,615,805	4,800	4,800	56,840	
1964	10,656,050	4,812	4,812	61,651	
1965	10,695,214	4,823	4,823	66,474	
1966	13,028,501	5,478	5,478	71,952	
1967	13,383,363	5,578	5,578	77,530	
1968	13,076,516	5,492	5,492	83,022	
1969	14,930,667	6,013	6,013	89,035	
1970	17,553,860	6,750	6,750	95,785	
1971	16,878,801	6,560	6,560	102,346	
1972	18,803,924	7,101	7,101	109,447	
1973	17,322,657	6,685	6,685	116,132	
1974	19,147,945	7,198	7,198	123,330	
1975	18,341,243	6,971	6,971	130,301	
1976	18,777,713	7,094	7,094	137,395	
1977	19,802,196	7,382	7,382	144,777	
1978	22,058,899	8,016	8,016	152,793	
<b>1979</b>	<b>21,379,426</b>	<b>7,825</b>	<b>7,825</b>	<b>160,618</b>	<b>Estimated Cycles 1940-1979</b>
1980	25,361,211	9,518	9,518	170,136	
1981	27,119,928	10,152	10,152	180,288	
1982	24,658,173	9,250	9,250	189,538	
1983	31,731,841	10,968	10,968	200,506	
1984	28,238,848	9,876	9,876	210,382	
1985	20,709,329	7,811	7,811	218,193	
1986	21,376,690	7,744	7,744	225,937	
1987	27,209,600	9,711	9,711	235,648	
1988	29,268,619	10,282	10,282	245,930	
1989	28,770,924	10,028	10,028	255,958	
1990	34,050,057	11,077	11,077	267,035	
1991	29,804,584	10,393	10,393	277,428	
1992	31,641,434	10,180	10,180	287,608	
1993	19,530,801	6,622	6,622	294,230	
1994	23,424,329	7,658	7,658	301,888	
<b>1995</b>	<b>29,581,566</b>	<b>10,107</b>	<b>10,107</b>	<b>311,995</b>	<b>Major Rehab at 16</b>
1996	29,881,269	10,204	10,204	10,204	
1997	27,196,206	9,232	9,232	19,436	
1998	28,872,800	9,567	9,567	29,003	
<b>1999</b>	<b>33,139,184</b>	<b>10,713</b>	<b>10,713</b>	<b>39,716</b>	<b>Actual Cycle from 1996-1999</b>

Predicted Cycles at Lock 16 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
2000	34,597,000	11,539	11,539	51,255		
2001	34,716,600	11,573	11,573	62,828		
2002	34,836,200	11,606	11,606	74,434		
2003	34,955,800	11,640	11,640	86,074		
2004	35,075,400	11,674	11,674	97,748		
2005	35,195,000	11,707	11,707	109,455		
2006	35,206,600	11,710	11,710	121,165		
2007	35,218,200	11,714	11,714	132,879		
2008	35,229,800	11,717	11,717	144,596		
2009	35,241,400	11,720	11,720	156,316		
2010	35,253,000	11,723	11,723	168,040		
2011	35,266,200	11,727	11,727	179,767		
2012	35,279,400	11,731	11,731	191,498		
2013	35,292,600	11,735	11,735	203,232		
2014	35,305,800	11,738	11,738	214,971		
2015	35,319,000	11,742	11,742	226,713		
2016	35,364,200	11,755	11,755	238,467		
2017	35,409,400	11,767	11,767	250,235		
2018	35,454,600	11,780	11,780	262,015		
2019	35,499,800	11,793	11,793	273,808		
2020	35,545,000	11,806	11,806	285,613		
2021	35,574,800	11,814	11,814	297,427		
<b>2022</b>	<b>35,604,600</b>	<b>11,822</b>	<b>11,822</b>	<b>309,249</b>	<b>Major Rehab at 16</b>	
2023	35,634,400	11,831	11,831	11,831		
2024	35,664,200	11,839	11,839	23,670		
2025	35,694,000	11,847	11,847	35,517		
2026	35,723,800	11,856	11,856	47,373		
2027	35,753,600	11,864	11,864	59,237		
2028	35,783,400	11,873	11,873	71,109		
2029	35,813,200	11,881	11,881	82,990		
2030	35,843,000	11,889	11,889	94,880		
2031	35,871,300	11,897	11,897	106,777		
2032	35,899,600	11,905	11,905	118,682		
2033	35,927,900	11,913	11,913	130,595		
2034	35,956,200	11,921	11,921	142,516		
2035	35,984,500	11,929	11,929	154,445		
2036	36,012,800	11,937	11,937	166,382		
2037	36,041,100	11,945	11,945	178,327		
2038	36,069,400	11,953	11,953	190,280		
2039	36,097,700	11,961	11,961	202,241		
2040	36,126,000	11,969	11,969	214,210		
2041	36,157,800	11,978	11,978	226,187		
2042	36,189,600	11,987	11,987	238,174		
2043	36,221,400	11,996	11,996	250,170		
2044	36,253,200	12,005	12,005	262,174		
2045	36,285,000	12,013	12,013	274,188		
2046	36,316,800	12,022	12,022	286,210		
2047	36,348,600	12,031	12,031	298,241		
<b>2048</b>	<b>36,380,400</b>	<b>12,040</b>	<b>12,040</b>	<b>310,282</b>	<b>Major Rehab at 16</b>	
2049	36,412,200	12,049	12,049	12,049		
2050	36,444,000	12,058	12,058	24,107		

Predicted Cycles at LocK 15 without Large Scale Improvements					
Without Large Scale Improvements					
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	2,966,270	4,041	4,041	4,041	4,041
1949	3,351,762	4,177	4,177	8,217	
1950	3,896,771	4,369	4,369	12,586	
1951	3,947,964	4,387	4,387	16,973	
1952	3,625,619	4,273	4,273	21,247	
1953	4,450,929	4,565	4,565	25,812	
1954	5,035,566	4,771	4,771	30,583	
1955	5,892,743	5,074	5,074	35,656	
1956	6,116,409	5,153	5,153	40,809	
1957	6,444,831	5,269	5,269	46,077	
1958	7,352,516	5,589	5,589	51,666	
1959	7,752,592	5,730	5,730	57,397	
1960	8,405,358	5,961	5,961	63,357	
1961	8,341,497	5,938	5,938	69,295	
1962	9,025,490	6,180	6,180	75,475	
1963	10,547,680	6,717	6,717	82,192	
1964	10,582,567	6,729	6,729	88,921	
1965	10,336,084	6,642	6,642	95,563	
1966	12,608,691	7,444	7,444	103,007	
1967	12,992,806	7,580	7,580	110,587	
1968	12,394,383	7,369	7,369	117,956	
1969	14,047,977	7,952	7,952	125,908	
1970	16,652,366	8,872	8,872	134,780	
1971	16,126,567	8,686	8,686	143,466	
1972	17,978,089	9,340	9,340	152,806	
1973	16,354,197	8,767	8,767	161,573	
1974	17,490,633	9,168	9,168	170,740	
1975	16,563,187	8,840	8,840	179,581	
1976	17,192,347	9,062	9,062	188,643	
1977	18,045,194	9,363	9,363	198,007	
1978	19,988,374	10,049	10,049	208,056	
<b>1979</b>	<b>19,951,280</b>	<b>10,036</b>	<b>10,036</b>	<b>218,092</b>	<b>Estimated Cycles 1940-1979</b>
1980	22,904,124	11,833	11,833	229,925	
1981	24,671,027	12,681	12,681	242,606	
1982	22,383,041	11,715	11,715	254,321	
1983	29,269,900	13,677	13,677	267,998	
1984	25,680,323	12,252	12,252	280,250	
1985	19,341,477	9,807	9,807	290,057	
1986	19,561,320	9,932	9,932	299,989	
1987	25,180,350	12,719	12,719	312,708	
1988	27,222,057	12,077	12,077	324,785	
1989	26,967,280	12,707	12,707	337,492	
1990	31,944,894	13,728	13,728	351,220	
1991	30,192,379	13,349	13,349	364,569	
1992	30,402,635	12,974	12,974	377,543	
1993	18,697,472	7,969	7,969	385,512	
1994	22,256,229	10,069	10,069	395,581	
<b>1995</b>	<b>27,825,010</b>	<b>12,841</b>	<b>12,841</b>	<b>408,422</b>	<b>Major Rehab at 15</b>
1996	28,257,806	13,009	13,009	13,009	
1997	25,559,454	12,052	12,052	25,061	
1998	27,440,301	12,926	12,926	37,987	
<b>1999</b>	<b>31,209,760</b>	<b>13,864</b>	<b>13,864</b>	<b>51,851</b>	<b>Actual Cycle from 1996-1999</b>

Predicted Cycles at LocK 15 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
2000	33,017,000	14,649	14,649	14,649	66,500	
2001	33,125,800	14,687	14,687	14,687	81,186	
2002	33,234,600	14,725	14,725	14,725	95,912	
2003	33,343,400	14,764	14,764	14,764	110,675	
2004	33,452,200	14,802	14,802	14,802	125,478	
2005	33,561,000	14,841	14,841	14,841	140,318	
2006	33,562,200	14,841	14,841	14,841	155,159	
2007	33,563,400	14,841	14,841	14,841	170,001	
2008	33,564,600	14,842	14,842	14,842	184,842	
2009	33,565,800	14,842	14,842	14,842	199,685	
2010	33,567,000	14,843	14,843	14,843	214,527	
2011	33,576,800	14,846	14,846	14,846	229,373	
2012	33,586,600	14,850	14,850	14,850	244,223	
2013	33,596,400	14,853	14,853	14,853	259,076	
2014	33,606,200	14,856	14,856	14,856	273,932	
2015	33,616,000	14,860	14,860	14,860	288,792	
2016	33,652,400	14,873	14,873	14,873	303,665	
2017	33,688,800	14,886	14,886	14,886	318,551	
2018	33,725,200	14,899	14,899	14,899	333,449	
2019	33,761,600	14,911	14,911	14,911	348,361	
2020	33,798,000	14,924	14,924	14,924	363,285	
2021	33,821,400	14,932	14,932	14,932	378,217	
2022	33,844,800	14,941	14,941	14,941	393,158	
<b>2023</b>	<b>33,868,200</b>	<b>14,949</b>	<b>14,949</b>	<b>408,107</b>		<b>Major Rehab at 15</b>
2024	33,891,600	14,957	14,957	14,957	14,957	
2025	33,915,000	14,966	14,966	14,966	29,923	
2026	33,938,400	14,974	14,974	14,974	44,897	
2027	33,961,800	14,982	14,982	14,982	59,879	
2028	33,985,200	14,990	14,990	14,990	74,869	
2029	34,008,600	14,999	14,999	14,999	89,867	
2030	34,032,000	15,007	15,007	15,007	104,874	
2031	34,054,800	15,015	15,015	15,015	119,889	
2032	34,077,600	15,023	15,023	15,023	134,912	
2033	34,100,400	15,031	15,031	15,031	149,943	
2034	34,123,200	15,039	15,039	15,039	164,982	
2035	34,146,000	15,047	15,047	15,047	180,029	
2036	34,168,800	15,055	15,055	15,055	195,084	
2037	34,191,600	15,063	15,063	15,063	210,147	
2038	34,214,400	15,071	15,071	15,071	225,218	
2039	34,237,200	15,079	15,079	15,079	240,298	
2040	34,260,000	15,087	15,087	15,087	255,385	
2041	34,286,700	15,097	15,097	15,097	270,482	
2042	34,313,400	15,106	15,106	15,106	285,588	
2043	34,340,100	15,116	15,116	15,116	300,703	
2044	34,366,800	15,125	15,125	15,125	315,828	
2045	34,393,500	15,134	15,134	15,134	330,963	
2046	34,420,200	15,144	15,144	15,144	346,107	
2047	34,446,900	15,153	15,153	15,153	361,260	
2048	34,473,600	15,163	15,163	15,163	376,422	
2049	34,500,300	15,172	15,172	15,172	391,595	
<b>2050</b>	<b>34,527,000</b>	<b>15,182</b>	<b>15,182</b>	<b>406,776</b>		<b>Major Rehab at 15</b>

Predicted Cycles at Lock 14 without Large Scale Improvements					
Without Large Scale Improvements					
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	2,685,856	4,163	4,163	4,163	4,163
1949	3,007,035	4,260	4,260	8,423	
1950	3,475,052	4,401	4,401	12,824	
1951	3,453,172	4,394	4,394	17,218	
1952	3,179,611	4,312	4,312	21,530	
1953	4,033,389	4,569	4,569	26,099	
1954	4,658,187	4,757	4,757	30,856	
1955	5,608,532	5,043	5,043	35,899	
1956	5,823,200	5,108	5,108	41,007	
1957	6,073,365	5,183	5,183	46,190	
1958	7,059,463	5,480	5,480	51,670	
1959	7,433,125	5,592	5,592	57,262	
1960	7,894,623	5,731	5,731	62,993	
1961	8,037,622	5,774	5,774	68,767	
1962	8,728,397	5,982	5,982	74,749	
1963	10,069,457	6,386	6,386	81,135	
1964	9,976,770	6,358	6,358	87,493	
1965	9,745,580	6,288	6,288	93,781	
1966	11,882,439	6,931	6,931	100,713	
1967	12,424,818	7,095	7,095	107,807	
1968	11,892,462	6,934	6,934	114,742	
1969	13,558,941	7,436	7,436	122,178	
1970	15,784,005	8,106	8,106	130,284	
1971	15,124,804	7,907	7,907	138,191	
1972	17,572,479	8,644	8,644	146,836	
1973	15,785,557	8,106	8,106	154,942	
1974	17,699,524	8,682	8,682	163,624	
1975	15,875,503	8,133	8,133	171,758	
1976	16,222,380	8,238	8,238	179,996	
1977	17,418,242	8,598	8,598	188,593	
1978	18,949,925	9,059	9,059	197,652	
<b>1979</b>	<b>18,725,013</b>	<b>8,991</b>	<b>8,991</b>	<b>206,643</b>	<b>Estimated Cycles 1940-1979</b>
1980	21,877,324	9,704	9,704	216,347	
1981	23,838,790	11,404	11,404	227,751	
1982	21,727,398	10,634	10,634	238,385	
1983	28,715,019	12,190	12,190	250,575	
1984	25,191,188	11,201	11,201	261,776	
1985	19,048,877	9,591	9,591	271,367	
1986	18,984,930	8,934	8,934	280,301	
1987	24,534,790	11,159	11,159	291,460	
1988	26,682,843	12,036	12,036	303,496	
1989	27,022,156	12,141	12,141	315,637	
1990	31,631,335	12,746	12,746	328,383	
1991	27,838,194	11,834	11,834	340,217	
1992	29,978,821	11,852	11,852	352,069	
1993	18,355,472	7,577	7,577	359,646	
1994	21,960,352	9,510	9,510	369,156	
1995	27,266,235	11,829	11,829	380,985	
1996	27,893,337	11,480	11,480	392,465	
1997	25,297,683	10,438	10,438	402,903	
1998	27,274,374	10,795	10,795	413,698	
<b>1999</b>	<b>30,839,734</b>	<b>12,114</b>	<b>12,114</b>	<b>425,812</b>	<b>Actual Cycle from 1980-1999</b>

Predicted Cycles at Lock 14 without Large Scale Improvements						
Without Large Scale Improvements						
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
<b>2000</b>	<b>32,790,000</b>	<b>13,225</b>		<b>13,225</b>	<b>439,037</b>	<b>Major Rehab at 14</b>
2001	32,900,000	13,258		13,258	13,258	
2002	33,010,000	13,291		13,291	26,549	
2003	33,120,000	13,324		13,324	39,873	
2004	33,230,000	13,357		13,357	53,230	
2005	33,340,000	13,390		13,390	66,620	
2006	33,341,800	13,391		13,391	80,011	
2007	33,343,600	13,391		13,391	93,402	
2008	33,345,400	13,392		13,392	106,794	
2009	33,347,200	13,392		13,392	120,186	
2010	33,349,000	13,393		13,393	133,579	
2011	33,361,000	13,397		13,397	146,976	
2012	33,373,000	13,400		13,400	160,376	
2013	33,385,000	13,404		13,404	173,780	
2014	33,397,000	13,407		13,407	187,187	
2015	33,409,000	13,411		13,411	200,598	
2016	33,446,800	13,422		13,422	214,020	
2017	33,484,600	13,434		13,434	227,454	
2018	33,522,400	13,445		13,445	240,899	
2019	33,560,200	13,456		13,456	254,356	
2020	33,598,000	13,468		13,468	267,823	
2021	33,623,900	13,476		13,476	281,299	
2022	33,649,800	13,483		13,483	294,783	
<b>2023</b>	<b>33,675,700</b>	<b>13,491</b>		<b>13,491</b>	<b>308,274</b>	<b>Major Rehab at 14</b>
2024	33,701,600	13,499		13,499	13,499	
2025	33,727,500	13,507		13,507	27,006	
2026	33,753,400	13,515		13,515	40,521	
2027	33,779,300	13,522		13,522	54,043	
2028	33,805,200	13,530		13,530	67,573	
2029	33,831,100	13,538		13,538	81,111	
2030	33,857,000	13,546		13,546	94,657	
2031	33,883,700	13,554		13,554	108,211	
2032	33,910,400	13,562		13,562	121,773	
2033	33,937,100	13,570		13,570	135,343	
2034	33,963,800	13,578		13,578	148,921	
2035	33,990,500	13,586		13,586	162,507	
2036	34,017,200	13,594		13,594	176,101	
2037	34,043,900	13,602		13,602	189,703	
2038	34,070,600	13,610		13,610	203,313	
2039	34,097,300	13,618		13,618	216,931	
2040	34,124,000	13,626		13,626	230,557	
2041	34,155,100	13,636		13,636	244,193	
2042	34,186,200	13,645		13,645	257,838	
2043	34,217,300	13,654		13,654	271,492	
2044	34,248,400	13,664		13,664	285,156	
2045	34,279,500	13,673		13,673	298,829	
2046	34,310,600	13,682		13,682	312,511	
2047	34,341,700	13,692		13,692	326,203	
2048	34,372,800	13,701		13,701	339,904	
2049	34,403,900	13,710		13,710	353,614	
2050	34,435,000	13,720		13,720	367,334	

## **Appendix C: Estimation of Navigation Cycles with Large Scale Improvements**

Predicted Cycles at Lock 25 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1940	1,570,167	1,478		1,478			1,478
1941	1,974,121	1,594		1,594			3,071
1942	1,987,289	1,597		1,597			4,669
1943	1,608,788	1,489		1,489			6,158
1944	1,875,881	1,565		1,565			7,723
1945	2,033,557	1,611		1,611			9,334
1946	2,989,198	1,885		1,885			11,219
1947	3,120,342	1,923		1,923			13,142
1948	3,252,308	1,961		1,961			15,102
1949	3,654,954	2,076		2,076			17,178
1950	4,323,837	2,268		2,268			19,446
1951	4,225,148	2,240		2,240			21,686
1952	4,044,774	2,188		2,188			23,874
1953	5,072,640	2,483		2,483			26,357
1954	5,675,246	2,656		2,656			29,013
1955	6,530,038	2,901		2,901			31,914
1956	6,792,648	2,977		2,977			34,891
1957	7,460,929	3,168		3,168			38,059
1958	8,464,618	3,456		3,456			41,516
1959	9,154,872	3,655		3,655			45,170
1960	9,686,116	3,807		3,807			48,977
1961	9,762,011	3,829		3,829			52,806
1962	10,814,046	4,131		4,131			56,937
1963	12,599,623	4,643		4,643			61,580
1964	13,408,798	4,875		4,875			66,455
1965	13,425,723	4,880		4,880			71,336
1966	15,857,490	5,578		5,578			76,914
1967	16,355,932	5,721		5,721			82,635
1968	16,547,642	5,776		5,776			88,412
1969	18,622,522	6,372		6,372			94,783
1970	22,175,609	7,392		7,392			102,175
1971	21,430,888	7,178		7,178			109,353
1972	24,611,927	8,091		8,091			117,443
1973	22,706,350	7,544		7,544			124,987
1974	24,292,547	7,999		7,999			132,986
1975	23,712,446	7,833		7,833			140,819
1976	24,781,578	8,139		8,139			148,958
1977	25,093,200	8,229		8,229			157,187
1978	29,041,957	9,362		9,362			166,549
<b>1979</b>	<b>28,638,386</b>	<b>9,246</b>		<b>9,246</b>			<b>175,796</b>
<b>Estimated Cycles 1940-1979</b>							
1980	32,737,870	11,116	11,116			186,912	
1981	34,230,487	11,731	11,731			198,643	
1982	32,767,055	10,895	10,895			209,538	
1983	37,439,016	12,498	12,498			222,036	
1984	36,167,255	11,606	11,606			233,642	
1985	26,109,104	8,770	8,770			242,412	
1986	28,159,960	9,246	9,246			251,658	
1987	35,319,224	11,133	11,133			262,791	
1988	37,875,033	12,107	12,107			274,898	
1989	36,218,686	11,703	11,703			286,601	
1990	42,339,143	13,223	13,223			299,824	
1991	37,501,847	12,169	12,169			311,993	
1992	39,378,151	12,235	12,235			324,228	
1993	26,560,658	8,025	8,025			332,253	
1994	30,758,651	9,218	9,218			341,471	
<b>1995</b>	<b>37,434,409</b>	<b>11,279</b>	<b>11,279</b>			<b>352,750</b>	<b>Major Rehab at 25</b>

Predicted Cycles at Lock 25 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1996	36,088,709		11,247	11,247			11,247
1997	33,638,634		10,220	10,220			21,467
1998	34,819,845		10,150	10,150			31,617
<b>1999</b>	<b>39,536,830</b>		<b>11,312</b>	<b>11,312</b>			<b>42,929</b>
<b>2000</b>	<b>42,910,000</b>	<b>13,342</b>	<b>13,342</b>				<b>56,271</b>
2001	43,094,600	13,395	13,395				69,667
2002	43,279,200	13,448	13,448				83,115
2003	43,463,800	13,501	13,501				96,616
2004	43,648,400	13,554	13,554				110,170
2005	43,833,000	13,607	13,607				123,777
2006	43,901,000	13,627	13,627				137,404
2007	43,969,000	13,646	13,646				151,050
2008	44,037,000	13,666	13,666				164,716
2009	44,105,000	13,685	13,685				178,401
<b>2010</b>	<b>44,173,000</b>	<b>13,705</b>	<b>13,705</b>	<b>54,209,000</b>		<b>192,106</b>	<b>Large Scale Improvements</b>
2011				54,475,400	10,393	10,393	
2012				54,741,800	10,441	20,834	
2013				55,008,200	10,488	31,322	
2014				55,274,600	10,536	41,858	
2015				55,541,000	10,584	52,442	
2016				55,816,000	10,633	63,075	
2017				56,091,000	10,682	73,757	
2018				56,366,000	10,731	84,489	
2019				56,641,000	10,781	95,269	
2020				56,916,000	10,830	106,099	
2021				57,159,300	10,873	116,973	
2022				57,402,600	10,917	127,890	
2023				57,645,900	10,961	138,850	
2024				57,889,200	11,004	149,855	
2025				58,132,500	11,048	160,902	
2026				58,375,800	11,091	171,993	
2027				58,619,100	11,135	183,128	
2028				58,862,400	11,178	194,307	
2029				59,105,700	11,222	205,528	
2030				59,349,000	11,265	216,794	
2031				59,550,300	11,301	228,095	
2032				59,751,600	11,337	239,433	
2033				59,952,900	11,374	250,806	
2034				60,154,200	11,410	262,216	
2035				60,355,500	11,446	273,661	
2036				60,556,800	11,482	285,143	
2037				60,758,100	11,518	296,661	
2038				60,959,400	11,554	308,214	
2039				61,160,700	11,590	319,804	
2040				61,362,000	11,626	331,430	
<b>2041</b>				<b>61,558,400</b>	<b>11,661</b>	<b>343,091</b>	<b>Major Rehab at 25</b>
2042				61,754,800	11,696	11,696	
2043				61,951,200	11,731	23,427	
2044				62,147,600	11,766	35,194	
2045				62,344,000	11,802	46,995	
2046				62,540,400	11,837	58,832	
2047				62,736,800	11,872	70,704	
2048				62,933,200	11,907	82,611	
2049				63,129,600	11,942	94,553	
2050				63,326,000	11,977	106,530	

Predicted Cycles at Lock 24 with Large Scale Improvements							
	Existing Lock			Lock E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1940	1,578,624	1,101		1,101			1,101
1941	1,975,878	1,215		1,215			2,315
1942	1,968,734	1,213		1,213			3,528
1943	1,669,539	1,127		1,127			4,654
1944	1,878,299	1,187		1,187			5,841
1945	2,029,925	1,230		1,230			7,071
1946	2,977,872	1,502		1,502			8,573
1947	3,149,689	1,551		1,551			10,125
1948	3,224,357	1,573		1,573			11,698
1949	3,645,372	1,694		1,694			13,392
1950	4,305,665	1,883		1,883			15,275
1951	4,199,346	1,853		1,853			17,128
1952	4,042,095	1,808		1,808			18,935
1953	5,053,533	2,098		2,098			21,033
1954	5,649,694	2,269		2,269			23,302
1955	6,505,230	2,515		2,515			25,817
1956	6,783,763	2,594		2,594			28,411
1957	7,437,070	2,782		2,782			31,193
1958	8,446,256	3,072		3,072			34,265
1959	9,180,898	3,282		3,282			37,547
1960	9,711,261	3,435		3,435			40,982
1961	9,638,452	3,414		3,414			44,396
1962	10,865,245	3,766		3,766			48,161
1963	12,611,627	4,267		4,267			52,428
1964	13,312,470	4,468		4,468			56,897
1965	13,521,270	4,528		4,528			61,425
1966	15,915,016	5,215		5,215			66,640
1967	16,312,126	5,329		5,329			71,969
1968	16,663,104	5,430		5,430			77,399
1969	18,371,594	5,920		5,920			83,319
1970	22,209,505	7,022		7,022			90,341
1971	21,563,788	6,836		6,836			97,177
1972	24,941,149	7,806		7,806			104,983
1973	22,940,935	7,232		7,232			112,214
1974	24,522,995	7,686		7,686			119,900
1975	23,713,451	7,453		7,453			127,353
1976	24,588,373	7,704		7,704			135,058
1977	25,057,500	7,839		7,839			142,897
1978	28,928,612	8,950		8,950			151,847
1979	<b>28,562,788</b>	<b>8,845</b>	<b>8,845</b>			<b>160,692</b>	<b>Estimated Cycles 1940-1979</b>
1980	32,749,649	10,837	10,837			171,529	
1981	33,908,995	11,270	11,270			182,799	
1982	32,763,728	10,507	10,507			193,306	
1983	37,345,441	12,164	12,164			205,470	
1984	35,962,865	11,051	11,051			216,521	
1985	26,101,054	8,361	8,361			224,882	
1986	28,162,425	8,617	8,617			233,499	
1987	35,313,874	10,800	10,800			244,299	
1988	37,885,828	11,681	11,681			255,980	
1989	36,137,676	11,171	11,171			267,151	
1990	42,352,920	12,968	12,968			280,119	
1991	37,341,861	11,453	11,453			291,572	
1992	39,423,782	11,922	11,922			303,494	
1993	26,581,272	8,010	8,010			311,504	
1994	30,735,288	8,772	8,772			320,276	
1995	<b>37,542,028</b>	<b>11,118</b>	<b>11,118</b>			<b>331,394</b>	<b>Major Rehab at 24</b>

Predicted Cycles at Lock 24 with Large Scale Improvements							
	Existing Lock			Lock E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1996	36,181,599		11,075	11,075			11,075
1997	33,614,530		9,851	9,851			20,926
1998	34,747,480		9,734	9,734			30,660
<b>1999</b>	<b>39,296,994</b>		<b>10,958</b>	<b>10,958</b>			<b>41,618</b>
							<b>Actual Cycle from 1996-1999</b>
2000	42,910,000	12,963	12,963				54,581
2001	43,094,600	13,016	13,016				67,596
2002	43,279,200	13,069	13,069				80,665
2003	43,463,800	13,122	13,122				93,787
2004	43,648,400	13,175	13,175				106,961
2005	43,833,000	13,228	13,228				120,189
2006	43,901,000	13,247	13,247				133,436
2007	43,969,000	13,267	13,267				146,703
2008	44,037,000	13,286	13,286				159,989
2009	44,105,000	13,306	13,306				173,295
<b>2010</b>	<b>44,173,000</b>	<b>13,325</b>	<b>13,325</b>	<b>54,209,000</b>		<b>186,620</b>	<b>Large Scale Improvements</b>
2011				54,475,400	10,210	10,210	
2012				54,741,800	10,258	20,469	
2013				55,008,200	10,306	30,775	
2014				55,274,600	10,354	41,129	
2015				55,541,000	10,402	51,531	
2016				55,816,000	10,452	61,983	
2017				56,091,000	10,501	72,484	
2018				56,366,000	10,551	83,034	
2019				56,641,000	10,600	93,634	
2020				56,916,000	10,650	104,284	
2021				57,159,300	10,693	114,977	
2022				57,402,600	10,737	125,714	
2023				57,645,900	10,781	136,495	
2024				57,889,200	10,825	147,320	
2025				58,132,500	10,869	158,189	
2026				58,375,800	10,912	169,101	
2027				58,619,100	10,956	180,057	
2028				58,862,400	11,000	191,057	
2029				59,105,700	11,044	202,101	
2030				59,349,000	11,088	213,188	
2031				59,550,300	11,124	224,312	
2032				59,751,600	11,160	235,472	
2033				59,952,900	11,196	246,668	
2034				60,154,200	11,232	257,901	
2035				60,355,500	11,269	269,170	
2036				60,556,800	11,305	280,475	
2037				60,758,100	11,341	291,816	
2038				60,959,400	11,377	303,193	
2039				61,160,700	11,414	314,607	
<b>2040</b>				<b>61,362,000</b>	<b>11,450</b>	<b>326,057</b>	<b>Major Rehab at 24</b>
2041				61,558,400	11,485	11,485	
2042				61,754,800	11,521	23,006	
2043				61,951,200	11,556	34,562	
2044				62,147,600	11,591	46,153	
2045				62,344,000	11,627	57,780	
2046				62,540,400	11,662	69,442	
2047				62,736,800	11,697	81,139	
2048				62,933,200	11,733	92,872	
2049				63,129,600	11,768	104,640	
2050				63,326,000	11,803	116,443	

Predicted Cycles at Lock 22 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	3,257,156	1,743		1,743			1,743
1949	3,657,908	1,856		1,856			3,600
1950	4,489,750	2,091		2,091			5,691
1951	4,193,536	2,008		2,008			7,699
1952	4,029,761	1,961		1,961			9,660
1953	5,099,453	2,263		2,263			11,923
1954	5,637,586	2,415		2,415			14,338
1955	6,528,046	2,666		2,666			17,004
1956	6,761,730	2,732		2,732			19,735
1957	7,389,315	2,909		2,909			22,644
1958	8,424,138	3,201		3,201			25,845
1959	9,131,161	3,400		3,400			29,245
1960	9,543,754	3,516		3,516			32,761
1961	9,630,482	3,541		3,541			36,302
1962	10,798,255	3,870		3,870			40,172
1963	12,571,123	4,370		4,370			44,542
1964	13,149,196	4,533		4,533			49,075
1965	13,292,429	4,573		4,573			53,648
1966	15,665,875	5,243		5,243			58,891
1967	16,010,320	5,340		5,340			64,231
1968	16,253,642	5,408		5,408			69,639
1969	18,062,328	5,919		5,919			75,558
1970	21,262,240	6,821		6,821			82,379
1971	20,703,681	6,663		6,663			89,042
1972	23,605,632	7,482		7,482			96,524
1973	21,782,904	6,968		6,968			103,492
1974	23,591,920	7,478		7,478			110,970
1975	22,999,712	7,311		7,311			118,280
1976	24,016,384	7,598		7,598			125,878
1977	24,257,539	7,666		7,666			133,544
1978	27,755,051	8,652		8,652			142,196
<b>1979</b>	<b>27,384,670</b>	<b>8,547</b>		<b>8,547</b>			<b>150,743</b>
							<b>Estimated Cycles 1940-1979</b>
1980	31,492,337	10,510	10,510				161,253
1981	32,849,454	11,080	11,080				172,333
1982	30,236,481	10,067	10,067				182,400
1983	36,353,436	11,900	11,900				194,300
1984	34,599,589	10,768	10,768				205,068
1985	25,074,264	7,905	7,905				212,973
1986	26,869,965	8,363	8,363				221,336
1987	34,210,177	10,470	10,470				231,806
1988	36,775,468	11,273	11,273				243,079
1989	34,937,546	11,206	11,206				254,285
<b>1990</b>	<b>41,352,068</b>	<b>12,269</b>		<b>12,269</b>			<b>266,554</b>
							<b>Major Rehab at 22</b>
1991	36,552,707	11,143	11,143				11,143
1992	38,286,421	11,306	11,306				22,449
1993	25,207,186	7,400	7,400				29,849
1994	29,410,587	8,261	8,261				38,110
1995	36,045,081	10,795	10,795				48,905
1996	34,832,298	10,672	10,672				59,577
1997	32,296,553	9,493	9,493				69,070
1998	33,648,345	9,501	9,501				78,571
<b>1999</b>	<b>38,074,304</b>	<b>10,711</b>		<b>10,711</b>			<b>89,282</b>
							<b>Actual Cycle from 1991-1999</b>

Predicted Cycles at Lock 22 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
2000	41,865,000	12,631		12,631			101,913
2001	42,045,200	12,682		12,682			114,595
2002	42,225,400	12,733		12,733			127,327
2003	42,405,600	12,783		12,783			140,110
2004	42,585,800	12,834		12,834			152,945
2005	42,766,000	12,885		12,885			165,830
2006	42,829,400	12,903		12,903			178,732
2007	42,892,800	12,921		12,921			191,653
2008	42,956,200	12,939		12,939			204,592
2009	43,019,600	12,956		12,956			217,548
<b>2010</b>	<b>43,083,000</b>	<b>12,974</b>		<b>12,974</b>	<b>52,948,000</b>		<b>230,523</b>
							<b>Large Scale Improvements</b>
2011				53,204,600	9,880	9,880	
2012				53,461,200	9,925	19,804	
2013				53,717,800	9,970	29,774	
2014				53,974,400	10,015	39,789	
2015				54,231,000	10,060	49,850	
2016				54,495,800	10,107	59,957	
2017				54,760,600	10,153	70,110	
2018				55,025,400	10,200	80,310	
2019				55,290,200	10,247	90,557	
2020				55,555,000	10,293	100,850	
2021				55,787,600	10,334	111,184	
2022				56,020,200	10,375	121,559	
2023				56,252,800	10,416	131,976	
2024				56,485,400	10,457	142,433	
2025				56,718,000	10,498	152,931	
2026				56,950,600	10,539	163,469	
2027				57,183,200	10,580	174,049	
2028				57,415,800	10,621	184,670	
2029				57,648,400	10,662	195,332	
2030				57,881,000	10,703	206,034	
2031				58,071,700	10,736	216,771	
2032				58,262,400	10,770	227,540	
2033				58,453,100	10,803	238,344	
2034				58,643,800	10,837	249,181	
<b>2035</b>				<b>58,834,500</b>	<b>10,870</b>	<b>260,051</b>	<b>Major Rehab at 22</b>
2036				59,025,200	10,904	10,904	
2037				59,215,900	10,938	21,842	
2038				59,406,600	10,971	32,813	
2039				59,597,300	11,005	43,818	
2040				59,788,000	11,038	54,856	
2041				59,974,600	11,071	65,927	
2042				60,161,200	11,104	77,031	
2043				60,347,800	11,137	88,168	
2044				60,534,400	11,170	99,337	
2045				60,721,000	11,202	110,540	
2046				60,907,600	11,235	121,775	
2047				61,094,200	11,268	133,043	
2048				61,280,800	11,301	144,344	
2049				61,467,400	11,334	155,678	
2050				61,654,000	11,367	167,045	

Predicted Cycles at Lock 21 with Large Scale Improvement							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	3,250,277	2,092		2,092			2,092
1949	3,657,394	2,204		2,204			4,297
1950	4,324,869	2,388		2,388			6,685
1951	4,198,771	2,353		2,353			9,038
1952	3,959,722	2,287		2,287			11,325
1953	4,993,949	2,572		2,572			13,897
1954	5,629,351	2,747		2,747			16,644
1955	6,547,665	2,999		2,999			19,643
1956	6,732,733	3,050		3,050			22,693
1957	7,301,966	3,207		3,207			25,900
1958	8,360,266	3,498		3,498			29,397
1959	8,965,200	3,664		3,664			33,061
1960	9,475,607	3,804		3,804			36,866
1961	9,503,880	3,812		3,812			40,678
1962	10,525,620	4,093		4,093			44,771
1963	12,176,529	4,547		4,547			49,318
1964	12,682,446	4,686		4,686			54,004
1965	12,944,194	4,758		4,758			58,763
1966	15,632,206	5,497		5,497			64,260
1967	15,794,893	5,542		5,542			69,802
1968	15,808,599	5,546		5,546			75,348
1969	17,721,553	6,072		6,072			81,420
1970	20,880,065	6,941		6,941			88,361
1971	20,170,528	6,745		6,745			95,106
1972	22,956,367	7,512		7,512			102,618
1973	21,301,967	7,057		7,057			109,674
1974	22,971,936	7,516		7,516			117,190
1975	22,344,001	7,343		7,343			124,533
1976	23,421,529	7,639		7,639			132,173
1977	23,875,803	7,764		7,764			139,937
1978	27,230,772	8,687		8,687			148,624
<b>1979</b>	<b>26,857,573</b>	<b>8,584</b>		<b>8,584</b>			<b>157,209</b>
							<b>Estimated Cycles 1940-1979</b>
1980	30,934,381	10,449	10,449				167,658
1981	32,386,232	11,119	11,119				178,777
1982	29,634,611	9,924	9,924				188,701
1983	35,809,671	11,841	11,841				200,542
1984	33,981,587	10,606	10,606				211,148
1985	24,418,332	7,997	7,997				219,145
1986	26,038,524	8,267	8,267				227,412
1987	33,383,266	10,280	10,280				237,692
1988	36,138,068	11,192	11,192				248,884
1989	34,362,226	10,824	10,824				259,708
<b>1990</b>	<b>40,848,768</b>	<b>12,288</b>		<b>12,288</b>			<b>271,996</b>
							<b>Major Rehab at 21</b>
1991	36,129,597	11,095	11,095				11,095
1992	37,942,533	11,467	11,467				22,562
1993	24,762,903	7,475	7,475				30,037
1994	28,778,306	8,501	8,501				38,538
1995	35,347,635	10,774	10,774				49,312
1996	34,494,594	10,696	10,696				60,008
1997	31,908,064	9,590	9,590				69,598
1998	33,312,353	9,715	9,715				79,313
<b>1999</b>	<b>37,863,139</b>	<b>10,931</b>		<b>10,931</b>			<b>90,244</b>
							<b>Actual Cycle from 1991-1999</b>

Predicted Cycles at Lock 21 with Large Scale Improvement							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
2000	41,105,000	12,502		12,502			102,746
2001	41,281,600	12,551		12,551			115,297
2002	41,458,200	12,600		12,600			127,897
2003	41,634,800	12,648		12,648			140,545
2004	41,811,400	12,697		12,697			153,242
2005	41,988,000	12,745		12,745			165,987
2006	42,047,400	12,762		12,762			178,749
2007	42,106,800	12,778		12,778			191,527
2008	42,166,200	12,794		12,794			204,321
2009	42,225,600	12,811		12,811			217,132
<b>2010</b>	<b>42,285,000</b>	<b>12,827</b>		<b>12,827</b>	<b>51,995,000</b>		<b>229,958</b>
							<b>Large Scale Improvements</b>
2011				52,244,000	9,735	9,735	
2012				52,493,000	9,778	19,513	
2013				52,742,000	9,821	29,334	
2014				52,991,000	9,864	39,197	
2015				53,240,000	9,906	49,104	
2016				53,497,400	9,951	59,054	
2017				53,754,800	9,995	69,049	
2018				54,012,200	10,039	79,088	
2019				54,269,600	10,083	89,172	
2020				54,527,000	10,128	99,300	
2021				54,519,800	10,127	109,426	
2022				54,769,600	10,169	119,596	
2023				55,019,400	10,212	129,808	
2024				55,269,200	10,255	140,063	
2025				55,519,000	10,298	150,362	
2026				55,768,800	10,341	160,703	
2027				56,018,600	10,384	171,087	
2028				56,268,400	10,427	181,515	
2029				56,518,200	10,470	191,985	
2030				56,768,000	10,513	202,498	
2031				56,948,900	10,544	213,042	
2032				57,129,800	10,575	223,618	
2033				57,310,700	10,607	234,224	
2034				57,491,600	10,638	244,862	
2035				57,672,500	10,669	255,531	
<b>2036</b>				<b>57,853,400</b>	<b>10,700</b>	<b>266,231</b>	<b>Major Rehab at 21</b>
2037				58,034,300	10,731	21,431	
2038				58,215,200	10,762	32,193	
2039				58,396,100	10,793	42,986	
2040				58,577,000	10,824	53,811	
2041				58,754,300	10,855	64,665	
2042				58,931,600	10,885	75,551	
2043				59,108,900	10,916	86,467	
2044				59,286,200	10,946	97,413	
2045				59,463,500	10,977	108,390	
2046				59,640,800	11,007	119,397	
2047				59,818,100	11,038	130,435	
2048				59,995,400	11,068	141,503	
2049				60,172,700	11,099	152,602	
2050				60,350,000	11,129	163,731	

Predicted Cycles at Lock 20 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	3,216,586	2,283		2,283			2,283
1949	3,599,981	2,386		2,386			4,669
1950	4,256,999	2,563		2,563			7,231
1951	4,123,491	2,527		2,527			9,758
1952	3,881,537	2,462		2,462			12,220
1953	4,829,604	2,717		2,717			14,936
1954	5,478,073	2,891		2,891			17,827
1955	6,323,748	3,119		3,119			20,946
1956	6,541,991	3,177		3,177			24,123
1957	7,112,616	3,331		3,331			27,454
1958	8,109,287	3,599		3,599			31,053
1959	8,629,438	3,739		3,739			34,792
1960	9,274,687	3,912		3,912			38,704
1961	9,108,352	3,868		3,868			42,572
1962	10,022,014	4,113		4,113			46,685
1963	11,766,146	4,583		4,583			51,267
1964	12,336,595	4,736		4,736			56,003
1965	12,613,811	4,811		4,811			60,814
1966	15,192,291	5,504		5,504			66,318
1967	15,317,958	5,538		5,538			71,856
1968	15,346,251	5,546		5,546			77,402
1969	17,291,642	6,069		6,069			83,471
1970	20,356,285	6,893		6,893			90,364
1971	19,592,226	6,688		6,688			97,052
1972	22,380,283	7,438		7,438			104,490
1973	20,779,467	7,007		7,007			111,497
1974	22,310,205	7,419		7,419			118,916
1975	21,698,943	7,254		7,254			126,170
1976	22,459,494	7,459		7,459			133,629
1977	22,970,560	7,597		7,597			141,226
1978	26,229,107	8,473		8,473			149,699
<b>1979</b>	<b>25,429,839</b>	<b>8,258</b>		<b>8,258</b>			<b>157,957</b>
							<b>Estimated Cycles 1940-1979</b>
1980	29,753,810	10,094	10,094				168,051
1981	31,563,357	10,953	10,953				179,004
1982	28,693,805	9,783	9,783				188,787
1983	35,001,990	11,460	11,460				200,247
1984	32,961,468	10,173	10,173				210,420
1985	23,663,845	7,767	7,767				218,187
1986	24,855,394	7,618	7,618				225,805
1987	31,943,807	10,685	10,685				236,490
1988	34,891,573	10,745	10,745				247,235
1989	33,524,054	10,592	10,592				257,827
<b>1990</b>	<b>39,789,475</b>	<b>11,527</b>	<b>11,527</b>				<b>269,354</b>
							<b>Major Rehab at 20</b>
1991	35,063,100	10,809	10,809				10,809
1992	36,614,710	11,176	11,176				21,985
1993	23,345,464	7,245	7,245				29,230
1994	27,441,221	8,306	8,306				37,536
1995	34,309,031	10,533	10,533				48,069
1996	33,147,979	10,376	10,376				58,445
1997	30,354,110	9,258	9,258				67,703
1998	31,745,410	9,362	9,362				77,065
<b>1999</b>	<b>36,512,515</b>	<b>10,615</b>	<b>10,615</b>				<b>87,680</b>
							<b>Actual Cycle from 1991-1999</b>

Predicted Cycles at Lock 20 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
2000	39,873,000	12,143		12,143			99,823
2001	40,049,600	12,191		12,191			112,014
2002	40,226,200	12,238		12,238			124,252
2003	40,402,800	12,286		12,286			136,538
2004	40,579,400	12,333		12,333			148,872
2005	40,756,000	12,381		12,381			161,252
2006	40,813,200	12,396		12,396			173,649
2007	40,870,400	12,412		12,412			186,060
2008	40,927,600	12,427		12,427			198,487
2009	40,984,800	12,442		12,442			210,930
<b>2010</b>	<b>41,042,000</b>	<b>12,458</b>		<b>12,458</b>	<b>50,247,000</b>		<b>223,387</b>
							<b>Large Scale Improvements</b>
2011				50,480,800	9,367	9,367	
2012				50,714,600	9,406	18,773	
2013				50,948,400	9,445	28,218	
2014				51,182,200	9,485	37,702	
2015				51,416,000	9,524	47,226	
2016				51,658,600	9,565	56,791	
2017				51,901,200	9,605	66,396	
2018				52,143,800	9,646	76,042	
2019				52,386,400	9,687	85,729	
2020				52,629,000	9,728	95,457	
2021				52,837,700	9,763	105,219	
2022				53,046,400	9,798	115,017	
2023				53,255,100	9,833	124,850	
2024				53,463,800	9,868	134,718	
2025				53,672,500	9,903	144,621	
2026				53,881,200	9,938	154,559	
2027				54,089,900	9,973	164,532	
2028				54,289,600	10,007	174,538	
2029				54,507,300	10,043	184,581	
2030				54,716,000	10,078	194,660	
2031				54,880,300	10,106	204,765	
2032				55,044,600	10,133	214,899	
2033				55,208,900	10,161	225,060	
2034				55,373,200	10,189	235,248	
2035				55,537,500	10,216	245,465	
2036				55,701,800	10,244	255,708	
<b>2037</b>				<b>55,866,100</b>	<b>10,271</b>	<b>265,980</b>	<b>Major Rehab at 20</b>
2038				56,030,400	10,299	10,299	
2039				56,194,700	10,327	20,626	
2040				56,359,000	10,354	30,980	
2041				56,521,600	10,382	41,361	
2042				56,684,200	10,409	51,770	
2043				56,846,800	10,436	62,207	
2044				57,009,400	10,464	72,670	
2045				57,172,000	10,491	83,161	
2046				57,334,600	10,518	93,679	
2047				57,497,200	10,545	104,224	
2048				57,659,800	10,573	114,797	
2049				57,822,400	10,600	125,397	
2050				57,985,000	10,627	136,025	

Predicted Cycles at Lock 19 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	3,131,156	1,408		1,408			1,408
1949	3,514,072	1,459		1,459			2,867
1950	4,117,866	1,539		1,539			4,407
1951	4,075,251	1,534		1,534			5,940
1952	3,734,104	1,488		1,488			7,429
1953	4,723,961	1,620		1,620			9,049
1954	5,238,070	1,688		1,688			10,737
1955	6,361,861	1,838		1,838			12,575
1956	6,287,118	1,828		1,828			14,403
1957	6,837,249	1,901		1,901			16,304
1958	7,862,064	2,037		2,037			18,341
1959	8,354,552	2,103		2,103			20,444
1960	8,877,604	2,172		2,172			22,617
1961	8,806,417	2,163		2,163			24,780
1962	9,700,344	2,282		2,282			27,062
1963	11,472,629	2,518		2,518			29,579
1964	11,985,112	2,586		2,586			32,165
1965	12,299,235	2,628		2,628			34,792
1966	14,840,092	2,965		2,965			37,758
1967	14,993,832	2,986		2,986			40,744
1968	14,864,151	2,969		2,969			43,712
1969	16,953,697	3,247		3,247			46,959
1970	20,029,663	3,656		3,656			50,615
1971	19,232,733	3,550		3,550			54,164
1972	22,043,136	3,923		3,923			58,088
1973	20,339,357	3,697		3,697			61,785
1974	21,693,445	3,877		3,877			65,662
1975	21,153,249	3,805		3,805			69,467
1976	21,938,042	3,909		3,909			73,376
1977	22,958,987	4,045		4,045			77,421
1978	25,598,071	4,396		4,396			81,818
<b>1979</b>	<b>24,909,291</b>	<b>4,305</b>		<b>4,305</b>			<b>86,122</b>
							<b>Estimated Cycles 1940-1979</b>
1980	29,067,375	5,244		5,244			91,366
1981	30,965,730	5,689		5,689			97,055
1982	27,879,923	5,043		5,043			102,098
1983	34,625,457	5,677		5,677			107,775
1984	32,317,898	5,099		5,099			112,874
1985	23,424,209	4,168		4,168			117,042
1986	24,289,929	4,162		4,162			121,204
1987	31,218,384	5,111		5,111			126,315
1988	33,903,408	5,599		5,599			131,914
1989	32,908,351	5,615		5,615			137,529
1990	39,153,123	5,946		5,946			143,475
1991	34,410,147	5,835		5,835			149,310
1992	35,982,699	5,730		5,730			155,040
1993	22,775,079	3,573		3,573			158,613
1994	26,677,268	4,318		4,318			162,931
1995	33,195,954	5,242		5,242			168,173
1996	32,335,946	5,331		5,331			173,504
1997	29,623,384	4,858		4,858			178,362
1998	31,076,726	4,919		4,919			183,281
<b>1999</b>	<b>35,803,139</b>	<b>5,354</b>		<b>5,354</b>			<b>188,635</b>
							<b>Actual Cycle from 1980-1999</b>

Predicted Cycles at Lock 19 with Large Scale Improvements								
	Existing Lock				Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
2000	39,017,000	6,181		6,181			194,816	
2001	39,184,600	6,203		6,203			201,020	
2002	39,352,200	6,226		6,226			207,245	
2003	39,519,800	6,248		6,248			213,493	
2004	39,687,400	6,270		6,270			219,763	
<b>2005</b>	<b>39,855,000</b>	<b>6,292</b>		<b>6,292</b>			<b>226,056</b>	<b>Major Rehab at 19</b>
2006	39,905,400	6,299		6,299			6,299	
2007	39,955,800	6,306		6,306			12,605	
2008	40,006,200	6,313		6,313			18,918	
2009	40,056,600	6,319		6,319			25,237	
<b>2010</b>	<b>40,107,000</b>	<b>6,326</b>		<b>6,326</b>	<b>49,154,000</b>		<b>31,563</b>	<b>Large Scale Improvements</b>
2011				49,377,600	7,559		39,122	
2012				49,601,200	7,589		46,710	
2013				49,824,800	7,618		54,329	
2014				50,048,400	7,648		61,977	
2015				50,272,000	7,678		69,655	
2016				50,503,400	7,709		77,364	
2017				50,734,800	7,739		85,103	
2018				50,966,200	7,770		92,873	
2019				51,197,600	7,801		100,674	
2020				51,429,000	7,832		108,506	
2021				51,625,900	7,858		116,364	
2022				51,822,800	7,884		124,248	
2023				52,019,700	7,910		132,158	
2024				52,216,600	7,937		140,095	
2025				52,413,500	7,963		148,058	
2026				52,610,400	7,989		156,047	
2027				52,807,300	8,015		164,062	
2028				53,004,200	8,041		172,103	
2029				53,201,100	8,067		180,170	
2030				53,398,000	8,094		188,264	
2031				53,549,300	8,114		196,378	
2032				53,700,600	8,134		204,512	
2033				53,851,900	8,154		212,666	
2034				54,003,200	8,174		220,840	
<b>2035</b>				<b>54,154,500</b>	<b>8,194</b>		<b>229,034</b>	<b>Major Rehab at 19</b>
2036				54,305,800	8,214		8,214	
2037				54,457,100	8,235		16,449	
2038				54,608,400	8,255		24,704	
2039				54,759,700	8,275		32,978	
2040				54,911,000	8,295		41,273	
2041				55,060,900	8,315		49,588	
2042				55,210,800	8,335		57,923	
2043				55,360,700	8,355		66,277	
2044				55,510,600	8,375		74,652	
2045				55,660,500	8,395		83,047	
2046				55,810,400	8,415		91,461	
2047				55,960,300	8,434		99,896	
2048				56,110,200	8,454		108,350	
2049				56,260,100	8,474		116,824	
2050				56,410,000	8,494		125,319	

Predicted Cycles at Lock 18 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	3,142,588	2,182		2,182			2,182
1949	3,469,566	2,275		2,275			4,457
1950	4,073,232	2,446		2,446			6,903
1951	4,037,546	2,436		2,436			9,339
1952	3,699,126	2,340		2,340			11,678
1953	4,617,063	2,600		2,600			14,278
1954	5,160,505	2,753		2,753			17,031
1955	6,304,890	3,077		3,077			20,109
1956	6,246,516	3,061		3,061			23,170
1957	6,782,677	3,212		3,212			26,382
1958	7,715,088	3,476		3,476			29,858
1959	8,191,968	3,611		3,611			33,470
1960	8,790,394	3,781		3,781			37,250
1961	8,641,432	3,739		3,739			40,989
1962	9,630,450	4,018		4,018			45,007
1963	11,020,329	4,412		4,412			49,419
1964	11,378,333	4,513		4,513			53,932
1965	11,560,909	4,565		4,565			58,497
1966	14,011,410	5,258		5,258			63,755
1967	14,264,898	5,330		5,330			69,085
1968	13,816,766	5,203		5,203			74,288
1969	15,869,262	5,784		5,784			80,072
1970	18,701,125	6,585		6,585			86,658
1971	17,783,930	6,326		6,326			92,984
1972	19,978,774	6,947		6,947			99,930
1973	18,310,452	6,475		6,475			106,405
1974	20,018,100	6,958		6,958			113,363
1975	19,472,413	6,804		6,804			120,167
1976	20,060,099	6,970		6,970			127,137
1977	20,796,353	7,178		7,178			134,316
1978	23,246,775	7,872		7,872			142,187
<b>1979</b>	<b>22,994,081</b>	<b>7,800</b>		<b>7,800</b>			<b>149,988</b>
							<b>Estimated Cycles 1940-1979</b>
1980	27,255,792	9,441		9,441			159,429
1981	29,277,166	10,592		10,592			170,021
1982	27,136,988	9,651		9,651			179,672
1983	34,160,853	11,492		11,492			191,164
1984	30,099,277	9,961		9,961			201,125
1985	22,294,829	7,779		7,779			208,904
1986	23,114,990	7,738		7,738			216,642
1987	29,841,560	9,919		9,919			226,561
1988	32,232,509	10,875		10,875			237,436
1989	31,370,442	10,641		10,641			248,077
1990	37,729,279	11,540		11,540			259,617
1991	32,703,896	10,311		10,311			269,928
1992	33,942,692	10,481		10,481			280,409
1993	21,225,959	6,392		6,392			286,801
1994	25,144,787	8,008		8,008			294,809
<b>1995</b>	<b>31,507,495</b>	<b>10,171</b>		<b>10,171</b>			<b>304,980</b>
							<b>Major Rehab at 18</b>
1996	31,766,629	10,204		10,204			10,204
1997	28,791,241	9,216		9,216			19,420
1998	31,228,140	9,573		9,573			28,993
<b>1999</b>	<b>35,707,505</b>	<b>10,889</b>		<b>10,889</b>			<b>39,882</b>
							<b>Actual Cycle from 1996-1999</b>

Predicted Cycles at Lock 18 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
2000	36,798,000	11,707		11,707			51,589
2001	36,940,600	11,747		11,747			63,336
2002	37,083,200	11,788		11,788			75,124
2003	37,225,800	11,828		11,828			86,951
2004	37,368,400	11,868		11,868			98,820
2005	37,511,000	11,909		11,909			110,728
2006	37,539,400	11,917		11,917			122,645
2007	37,567,800	11,925		11,925			134,570
2008	37,596,200	11,933		11,933			146,502
2009	37,624,600	11,941		11,941			158,443
<b>2010</b>	<b>37,653,000</b>	<b>11,949</b>		<b>11,949</b>	<b>46,090,000</b>		<b>170,392</b>
							<b>Large Scale Improvements</b>
2011				46,275,400	14,389		184,781
2012				46,460,800	14,441		199,222
2013				46,646,200	14,494		213,716
2014				46,831,600	14,546		228,263
2015				47,017,000	14,599		242,861
2016				47,215,800	14,655		257,516
2017				47,414,600	14,711		272,228
2018				47,613,400	14,768		286,995
<b>2019</b>				<b>47,812,200</b>	<b>14,824</b>		<b>301,819</b>
							<b>Major Rehab at 18</b>
2020				48,011,000	14,880		14,880
2021				48,172,000	14,926		29,806
2022				48,333,000	14,971		44,777
2023				48,494,000	15,017		59,794
2024				48,655,000	15,062		74,856
2025				48,816,000	15,108		89,964
2026				48,977,000	15,153		105,118
2027				49,138,000	15,199		120,317
2028				49,299,000	15,245		135,561
2029				49,460,000	15,290		150,851
2030				49,621,000	15,336		166,187
2031				49,732,200	15,367		181,554
2032				49,843,400	15,399		196,953
2033				49,954,600	15,430		212,383
2034				50,065,800	15,462		227,845
2035				50,177,000	15,493		243,338
2036				50,288,200	15,525		258,863
2037				50,399,400	15,556		274,419
2038				50,510,600	15,587		290,006
<b>2039</b>				<b>50,621,800</b>	<b>15,619</b>		<b>305,625</b>
							<b>Major Rehab at 18</b>
2040				50,733,000	15,650		15,650
2041				50,845,200	15,682		31,333
2042				50,957,400	15,714		47,047
2043				51,069,600	15,746		62,792
2044				51,181,800	15,777		78,570
2045				51,294,000	15,809		94,379
2046				51,406,200	15,841		110,220
2047				51,518,400	15,873		126,093
2048				51,630,600	15,904		141,997
2049				51,742,800	15,936		157,933
2050				51,855,000	15,968		173,901

Predicted Cycles at Lock 17 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	3,140,904	2,120		2,120			2,120
1949	3,477,893	2,212		2,212			4,332
1950	4,046,442	2,366		2,366			6,698
1951	4,003,977	2,354		2,354			9,052
1952	3,658,761	2,261		2,261			11,312
1953	4,582,666	2,511		2,511			13,823
1954	5,112,167	2,654		2,654			16,478
1955	6,289,579	2,974		2,974			19,451
1956	6,232,861	2,958		2,958			22,410
1957	6,684,067	3,080		3,080			25,490
1958	7,572,454	3,321		3,321			28,811
1959	7,998,234	3,437		3,437			32,248
1960	8,692,694	3,625		3,625			35,873
1961	8,565,102	3,590		3,590			39,463
1962	9,316,470	3,794		3,794			43,257
1963	10,772,663	4,188		4,188			47,445
1964	10,903,333	4,224		4,224			51,669
1965	11,146,484	4,290		4,290			55,959
1966	13,581,871	4,950		4,950			60,909
1967	13,846,768	5,022		5,022			65,930
1968	13,454,216	4,915		4,915			70,846
1969	15,595,107	5,495		5,495			76,341
1970	18,397,510	6,255		6,255			82,596
1971	17,546,911	6,024		6,024			88,620
1972	19,350,409	6,513		6,513			95,133
1973	17,933,697	6,129		6,129			101,262
1974	19,887,070	6,658		6,658			107,921
1975	19,107,453	6,447		6,447			114,368
1976	19,420,055	6,532		6,532			120,900
1977	20,249,573	6,757		6,757			127,657
1978	22,701,236	7,421		7,421			135,078
<b>1979</b>	<b>22,293,116</b>	<b>7,311</b>		<b>7,311</b>			<b>142,388</b>
							<b>Estimated Cycles 1940-1979</b>
1980	26,361,211	9,389	9,389				151,777
1981	28,389,794	10,122	10,122				161,899
1982	26,180,221	9,278	9,278				171,177
1983	33,479,331	10,905	10,905				182,082
1984	29,377,017	9,244	9,244				191,326
1985	21,812,672	7,193	7,193				198,519
1986	22,604,590	7,064	7,064				205,583
1987	29,226,120	9,473	9,473				215,056
1988	31,448,709	10,230	10,230				225,286
1989	30,857,392	9,850	9,850				235,136
1990	37,316,583	10,925	10,925				246,061
1991	32,513,260	9,790	9,790				255,851
1992	33,279,329	9,955	9,955				265,806
1993	20,530,312	6,066	6,066				271,872
1994	24,481,119	7,207	7,207				279,079
<b>1995</b>	<b>30,513,874</b>	<b>9,451</b>	<b>9,451</b>				<b>288,530</b>
							<b>Major Rehab at 17</b>
1996	30,942,140	9,625	9,625				9,625
1997	27,915,871	8,356	8,356				17,981
1998	30,015,252	8,717	8,717				26,698
<b>1999</b>	<b>34,170,210</b>	<b>9,865</b>	<b>9,865</b>				<b>36,563</b>
							<b>Actual Cycle from 1996-1999</b>

Predicted Cycles at Lock 17 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
2000	35,988,000	11,022		11,022			47,585
2001	36,120,000	11,058		11,058			58,642
2002	36,252,000	11,093		11,093			69,736
2003	36,384,000	11,129		11,129			80,865
2004	36,516,000	11,165		11,165			92,030
2005	36,648,000	11,201		11,201			103,231
2006	36,667,800	11,206		11,206			114,437
2007	36,687,600	11,211		11,211			125,648
2008	36,707,400	11,217		11,217			136,865
2009	36,727,200	11,222		11,222			148,087
<b>2010</b>	<b>36,747,000</b>	<b>11,228</b>		<b>11,228</b>	<b>45,011,000</b>		<b>159,315</b>
							<b>Large Scale Improvements</b>
2011				45,184,600	13,514		172,829
2012				45,358,200	13,561		186,390
2013				45,531,800	13,608		199,998
2014				45,705,400	13,655		213,653
2015				45,879,000	13,702		227,356
2016				46,066,400	13,753		241,109
2017				46,253,800	13,804		254,913
2018				46,441,200	13,855		268,767
<b>2019</b>				<b>46,628,600</b>	<b>13,905</b>		<b>282,673</b>
							<b>Major Rehab at 17</b>
2020				46,816,000	13,956		13,956
2021				46,965,200	13,997		27,953
2022				47,114,400	14,037		41,990
2023				47,263,600	14,078		56,068
2024				47,412,800	14,118		70,185
2025				47,562,000	14,158		84,344
2026				47,711,200	14,199		98,543
2027				47,860,400	14,239		112,782
2028				48,009,600	14,280		127,062
2029				48,158,800	14,320		141,382
2030				48,308,000	14,361		155,742
2031				48,405,900	14,387		170,129
2032				48,503,800	14,414		184,543
2033				48,601,700	14,440		198,983
2034				48,699,600	14,467		213,450
2035				48,797,500	14,493		227,943
2036				48,895,400	14,520		242,463
2037				48,993,300	14,546		257,009
2038				49,091,200	14,573		271,582
<b>2039</b>				<b>49,189,100</b>	<b>14,599</b>		<b>286,181</b>
							<b>Major Rehab at 17</b>
2040				49,287,000	14,626		14,626
2041				49,386,900	14,653		29,279
2042				49,486,800	14,680		43,959
2043				49,586,700	14,707		58,666
2044				49,686,600	14,734		73,400
2045				49,786,500	14,761		88,161
2046				49,886,400	14,788		102,950
2047				49,986,300	14,815		117,765
2048				50,086,200	14,842		132,607
2049				50,186,100	14,870		147,477
2050				50,286,000	14,897		162,374

Predicted Cycles at Lock 16 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB
1948	3,114,731	2,693		2,693			2,693
1949	3,439,972	2,784		2,784			5,477
1950	4,008,822	2,944		2,944			8,420
1951	4,061,294	2,959		2,959			11,379
1952	3,677,407	2,851		2,851			14,230
1953	4,258,150	3,014		3,014			17,244
1954	5,057,671	3,239		3,239			20,482
1955	6,100,510	3,532		3,532			24,014
1956	6,188,635	3,556		3,556			27,570
1957	6,623,098	3,678		3,678			31,249
1958	7,437,979	3,907		3,907			35,156
1959	7,916,704	4,042		4,042			39,198
1960	8,669,087	4,253		4,253			43,452
1961	8,432,267	4,187		4,187			47,638
1962	9,193,312	4,401		4,401			52,039
1963	10,615,805	4,800		4,800			56,840
1964	10,656,050	4,812		4,812			61,651
1965	10,695,214	4,823		4,823			66,474
1966	13,028,501	5,478		5,478			71,952
1967	13,383,363	5,578		5,578			77,530
1968	13,076,516	5,492		5,492			83,022
1969	14,930,667	6,013		6,013			89,035
1970	17,553,860	6,750		6,750			95,785
1971	16,878,801	6,560		6,560			102,346
1972	18,803,924	7,101		7,101			109,447
1973	17,322,657	6,685		6,685			116,132
1974	19,147,945	7,198		7,198			123,330
1975	18,341,243	6,971		6,971			130,301
1976	18,777,713	7,094		7,094			137,395
1977	19,802,196	7,382		7,382			144,777
1978	22,058,899	8,016		8,016			152,793
<b>1979</b>	<b>21,379,426</b>	<b>7,825</b>	<b>7,825</b>			<b>160,618</b>	<b>Estimated Cycles 1940-1979</b>
1980	25,361,211	9,518	9,518			170,136	
1981	27,119,928	10,152	10,152			180,288	
1982	24,658,173	9,250	9,250			189,538	
1983	31,731,841	10,968	10,968			200,506	
1984	28,238,848	9,876	9,876			210,382	
1985	20,709,329	7,811	7,811			218,193	
1986	21,376,690	7,744	7,744			225,937	
1987	27,209,600	9,711	9,711			235,648	
1988	29,268,619	10,282	10,282			245,930	
1989	28,770,924	10,028	10,028			255,958	
1990	34,050,057	11,077	11,077			267,035	
1991	29,804,584	10,393	10,393			277,428	
1992	31,641,434	10,180	10,180			287,608	
1993	19,530,801	6,622	6,622			294,230	
1994	23,424,329	7,658	7,658			301,888	
<b>1995</b>	<b>29,581,566</b>	<b>10,107</b>	<b>10,107</b>			<b>311,995</b>	<b>Major Rehab at 16</b>
1996	29,881,269	10,204	10,204			10,204	
1997	27,196,206	9,232	9,232			19,436	
1998	28,872,800	9,567	9,567			29,003	
<b>1999</b>	<b>33,139,184</b>	<b>10,713</b>	<b>10,713</b>			<b>39,716</b>	<b>Actual Cycle from 1996-1999</b>

Predicted Cycles at Lock 16 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB
2000	34,597,000	11,539		11,539			51,255
2001	34,716,600	11,573		11,573			62,828
2002	34,836,200	11,606		11,606			74,434
2003	34,955,800	11,640		11,640			86,074
2004	35,075,400	11,674		11,674			97,748
2005	35,195,000	11,707		11,707			109,455
2006	35,206,600	11,710		11,710			121,165
2007	35,218,200	11,714		11,714			132,879
2008	35,229,800	11,717		11,717			144,596
2009	35,241,400	11,720		11,720			156,316
<b>2010</b>	<b>35,253,000</b>	<b>11,723</b>		<b>11,723</b>	<b>43,356,000</b>		<b>168,040</b>
							<b>Large Scale Improvements</b>
2011				43,521,800	14,047	182,087	
2012				43,687,600	14,094	196,180	
2013				43,853,400	14,140	210,320	
2014				44,019,200	14,187	224,507	
2015				44,185,000	14,233	238,741	
2016				44,359,000	14,282	253,023	
2017				44,533,000	14,331	267,354	
2018				44,707,000	14,380	281,734	
2019				44,881,000	14,429	296,163	
<b>2020</b>				<b>45,055,000</b>	<b>14,478</b>	<b>310,641</b>	<b>Major Rehab at 16</b>
2021				45,191,100	14,516	14,516	
2022				45,327,200	14,554	29,070	
2023				45,463,300	14,593	43,663	
2024				45,599,400	14,631	58,294	
2025				45,735,500	14,669	72,963	
2026				45,871,600	14,707	87,670	
2027				46,007,700	14,746	102,416	
2028				46,143,800	14,784	117,199	
2029				46,279,900	14,822	132,021	
2030				46,416,000	14,860	146,882	
2031				46,498,600	14,883	161,765	
2032				46,581,200	14,907	176,672	
2033				46,663,800	14,930	191,602	
2034				46,746,400	14,953	206,555	
2035				46,829,000	14,976	221,531	
2036				46,911,600	15,000	236,531	
2037				46,994,200	15,023	251,554	
2038				47,076,800	15,046	266,600	
2039				47,159,400	15,069	281,669	
2040				47,242,000	15,092	296,761	
<b>2041</b>				<b>47,327,700</b>	<b>15,116</b>	<b>311,878</b>	<b>Major Rehab at 16</b>
2042				47,413,400	15,141	15,141	
2043				47,499,100	15,165	30,305	
2044				47,584,800	15,189	45,494	
2045				47,670,500	15,213	60,707	
2046				47,756,200	15,237	75,944	
2047				47,841,900	15,261	91,204	
2048				47,927,600	15,285	106,490	
2049				48,013,300	15,309	121,799	
2050				48,099,000	15,333	137,132	

Predicted Cycles at Lock 15 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	PREDICTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	2,966,270	4,041		4,041			4,041
1949	3,351,762	4,177		4,177			8,217
1950	3,896,771	4,369		4,369			12,586
1951	3,947,964	4,387		4,387			16,973
1952	3,625,619	4,273		4,273			21,247
1953	4,450,929	4,565		4,565			25,812
1954	5,035,566	4,771		4,771			30,583
1955	5,892,743	5,074		5,074			35,656
1956	6,116,409	5,153		5,153			40,809
1957	6,444,831	5,269		5,269			46,077
1958	7,352,516	5,589		5,589			51,666
1959	7,752,592	5,730		5,730			57,397
1960	8,405,358	5,961		5,961			63,357
1961	8,341,497	5,938		5,938			69,295
1962	9,025,490	6,180		6,180			75,475
1963	10,547,680	6,717		6,717			82,192
1964	10,582,567	6,729		6,729			88,921
1965	10,336,084	6,642		6,642			95,563
1966	12,608,691	7,444		7,444			103,007
1967	12,992,806	7,580		7,580			110,587
1968	12,394,383	7,369		7,369			117,956
1969	14,047,977	7,952		7,952			125,908
1970	16,652,366	8,872		8,872			134,780
1971	16,126,567	8,686		8,686			143,466
1972	17,978,089	9,340		9,340			152,806
1973	16,354,197	8,767		8,767			161,573
1974	17,490,633	9,168		9,168			170,740
1975	16,563,187	8,840		8,840			179,581
1976	17,192,347	9,062		9,062			188,643
1977	18,045,194	9,363		9,363			198,007
1978	19,988,374	10,049		10,049			208,056
<b>1979</b>	<b>19,951,280</b>	<b>10,036</b>		<b>10,036</b>			<b>218,092</b>
<b>Estimated Cycles 1940-1979</b>							
1980	22,904,124	11,833	11,833			229,925	
1981	24,671,027	12,681	12,681			242,606	
1982	22,383,041	11,715	11,715			254,321	
1983	29,269,900	13,677	13,677			267,998	
1984	25,680,323	12,252	12,252			280,250	
1985	19,341,477	9,807	9,807			290,057	
1986	19,561,320	9,932	9,932			299,989	
1987	25,180,350	12,719	12,719			312,708	
1988	27,222,057	12,077	12,077			324,785	
1989	26,967,280	12,707	12,707			337,492	
1990	31,944,894	13,728	13,728			351,220	
1991	30,192,379	13,349	13,349			364,569	
1992	30,402,635	12,974	12,974			377,543	
1993	18,697,472	7,969	7,969			385,512	
1994	22,256,229	10,069	10,069			395,581	
<b>1995</b>	<b>27,825,010</b>	<b>12,841</b>	<b>12,841</b>			<b>408,422</b>	<b>Major Rehab at 15</b>
1996	28,257,806	13,009	13,009			13,009	
1997	25,559,454	12,052	12,052			25,061	
1998	27,440,301	12,926	12,926			37,987	
<b>1999</b>	<b>31,209,760</b>	<b>13,864</b>	<b>13,864</b>			<b>51,851</b>	<b>Actual Cycle from 1996-1999</b>

Predicted Cycles at Lock 15 with Large Scale Improvements								
	Existing Lock				Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	PREDICTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.	REMARKS
2000	33,017,000	14,649		14,649			66,500	
2001	33,125,800	14,687		14,687			81,186	
2002	33,234,600	14,725		14,725			95,912	
2003	33,343,400	14,764		14,764			110,675	
2004	33,452,200	14,802		14,802			125,478	
2005	33,561,000	14,841		14,841			140,318	
2006	33,562,200	14,841		14,841			155,159	
2007	33,563,400	14,841		14,841			170,001	
2008	33,564,600	14,842		14,842			184,842	
2009	33,565,800	14,842		14,842			199,685	
<b>2010</b>	<b>33,567,000</b>	<b>14,843</b>		<b>14,843</b>	<b>41,358,000</b>		<b>214,527</b>	<b>Large Scale Improvements</b>
2011					41,511,400	17,647	232,174	
2012					41,664,800	17,701	249,875	
2013					41,818,200	17,755	267,631	
2014					41,971,600	17,809	285,440	
2015					42,125,000	17,864	303,304	
2016					42,281,600	17,919	321,223	
2017					42,438,200	17,974	339,197	
2018					42,594,800	18,029	357,226	
2019					42,751,400	18,085	375,311	
<b>2020</b>					<b>42,908,000</b>	<b>18,140</b>	<b>393,451</b>	<b>Major Rehab at 15</b>
2021					43,028,700	18,183	18,183	
2022					43,149,400	18,225	36,408	
2023					43,270,100	18,268	54,676	
2024					43,390,800	18,310	72,986	
2025					43,511,500	18,353	91,339	
2026					43,632,200	18,396	109,735	
2027					43,752,900	18,438	128,173	
2028					43,873,600	18,481	146,654	
2029					43,994,300	18,523	165,178	
2030					44,115,000	18,566	183,744	
2031					44,181,600	18,590	202,333	
2032					44,248,200	18,613	220,946	
2033					44,314,800	18,637	239,583	
2034					44,381,400	18,660	258,243	
2035					44,448,000	18,684	276,927	
2036					44,514,600	18,707	295,634	
2037					44,581,200	18,731	314,365	
2038					44,647,800	18,754	333,119	
2039					44,714,400	18,778	351,897	
2040					44,781,000	18,801	370,698	
2041					44,851,200	18,826	389,524	
<b>2042</b>					<b>44,921,400</b>	<b>18,851</b>	<b>408,375</b>	<b>Major Rehab at 15</b>
2043					44,991,600	18,876	18,876	
2044					45,061,800	18,900	37,776	
2045					45,132,000	18,925	56,701	
2046					45,202,200	18,950	75,651	
2047					45,272,400	18,975	94,626	
2048					45,342,600	18,999	113,625	
2049					45,412,800	19,024	132,649	
2050					45,483,000	19,049	151,698	

Predicted Cycles at Lock 14 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
1948	2,685,856	4,163		4,163			4,163
1949	3,007,035	4,260		4,260			8,423
1950	3,475,052	4,401		4,401			12,824
1951	3,453,172	4,394		4,394			17,218
1952	3,179,611	4,312		4,312			21,530
1953	4,033,389	4,569		4,569			26,099
1954	4,658,187	4,757		4,757			30,856
1955	5,608,532	5,043		5,043			35,899
1956	5,823,200	5,108		5,108			41,007
1957	6,073,365	5,183		5,183			46,190
1958	7,059,463	5,480		5,480			51,670
1959	7,433,125	5,592		5,592			57,262
1960	7,894,623	5,731		5,731			62,993
1961	8,037,622	5,774		5,774			68,767
1962	8,728,397	5,982		5,982			74,749
1963	10,069,457	6,386		6,386			81,135
1964	9,976,770	6,358		6,358			87,493
1965	9,745,580	6,288		6,288			93,781
1966	11,882,439	6,931		6,931			100,713
1967	12,424,818	7,095		7,095			107,807
1968	11,892,462	6,934		6,934			114,742
1969	13,558,941	7,436		7,436			122,178
1970	15,784,005	8,106		8,106			130,284
1971	15,124,804	7,907		7,907			138,191
1972	17,572,479	8,644		8,644			146,836
1973	15,785,557	8,106		8,106			154,942
1974	17,699,524	8,682		8,682			163,624
1975	15,875,503	8,133		8,133			171,758
1976	16,222,380	8,238		8,238			179,996
1977	17,418,242	8,598		8,598			188,593
1978	18,949,925	9,059		9,059			197,652
<b>1979</b>	<b>18,725,013</b>	<b>8,991</b>	<b>8,991</b>			<b>206,643</b>	<b>Estimated Cycles 1940-1979</b>
1980	21,877,324	9,704	9,704			216,347	
1981	23,838,790	11,404	11,404			227,751	
1982	21,727,398	10,634	10,634			238,385	
1983	28,715,019	12,190	12,190			250,575	
1984	25,191,188	11,201	11,201			261,776	
1985	19,048,877	9,591	9,591			271,367	
1986	18,984,930	8,934	8,934			280,301	
1987	24,534,790	11,159	11,159			291,460	
1988	26,682,843	12,036	12,036			303,496	
1989	27,022,156	12,141	12,141			315,637	
1990	31,631,335	12,746	12,746			328,383	
1991	27,838,194	11,834	11,834			340,217	
1992	29,978,821	11,852	11,852			352,069	
1993	18,355,472	7,577	7,577			359,646	
1994	21,960,352	9,510	9,510			369,156	
1995	27,266,235	11,829	11,829			380,985	
1996	27,893,337	11,480	11,480			392,465	
1997	25,297,683	10,438	10,438			402,903	
1998	27,274,374	10,795	10,795			413,698	
<b>1999</b>	<b>30,839,734</b>	<b>12,114</b>	<b>12,114</b>			<b>425,812</b>	<b>Actual Cycle from 1980-1999</b>

Predicted Cycles at Lock 14 with Large Scale Improvements							
	Existing Lock			Plan E			
YEAR	TONS	EST. CYCLES	ACTUAL CYCLES	TOTAL CYCLES	FORCASTED TONS	FORCASTED CYCLES	CUMULATIVE CYCLES BETWEEN MAJOR REHAB.
2000	32,790,000	13,225		13,225			439,037
2001	32,900,000	13,258		13,258			13,258
2002	33,010,000	13,291		13,291			26,549
2003	33,120,000	13,324		13,324			39,873
2004	33,230,000	13,357		13,357			53,230
2005	33,340,000	13,390		13,390			66,620
2006	33,341,800	13,391		13,391			80,011
2007	33,343,600	13,391		13,391			93,402
2008	33,345,400	13,392		13,392			106,794
2009	33,347,200	13,392		13,392			120,186
2010	33,349,000	13,393		13,393	41,040,000		133,579
2011					41,193,400	15,754	149,333
2012					41,346,800	15,800	165,133
2013					41,500,200	15,846	180,980
2014					41,653,600	15,893	196,872
2015					41,807,000	15,939	212,811
2016					41,963,400	15,986	228,797
2017					42,119,800	16,033	244,830
2018					42,276,200	16,080	260,910
2019					42,432,600	16,127	277,037
2020					42,589,000	16,174	293,211
2021					42,711,000	16,211	309,422
2022					42,833,000	16,248	325,670
2023					42,955,000	16,284	341,954
2024					43,077,000	16,321	358,275
2025					43,199,000	16,358	374,633
2026					43,321,000	16,394	391,027
2027					43,443,000	16,431	407,459
2028					43,565,000	16,468	423,926
2029					43,687,000	16,505	440,431
2030					43,809,000	16,541	16,541
2031					43,877,400	16,562	33,103
2032					43,945,800	16,583	49,686
2033					44,014,200	16,603	66,289
2034					44,082,600	16,624	82,913
2035					44,151,000	16,644	99,557
2036					44,219,400	16,665	116,222
2037					44,287,800	16,685	132,907
2038					44,356,200	16,706	149,614
2039					44,424,600	16,727	166,340
2040					44,493,000	16,747	183,087
2041					44,567,500	16,770	199,857
2042					44,642,000	16,792	216,649
2043					44,716,500	16,815	233,464
2044					44,791,000	16,837	250,301
2045					44,865,500	16,859	267,160
2046					44,940,000	16,882	284,042
2047					45,014,500	16,904	300,946
2048					45,089,000	16,927	317,873
2049					45,163,500	16,949	334,822
2050					45,238,000	16,972	351,793

## **Appendix D: Estimation of Days Lost to Navigation without project**

Lock and Dam 20 W/O Project											
Year	Main Chamber Closures (Days)			Auxiliary Chamber Closures			Project Summary				
	Maint. Item	Unsched Closures	Scheduled Closures <sup>2</sup>	Maint. Item	Unsched Closures	Scheduled Closures	Main	Aux			
		Random	Cyclical Maintenance		Random Minor	Cyclical Maintenance		Un-sched	Sched	Un-sched	
2000	Scheduled Minor	19.11	1.00		N/A	N/A	N/A	19.11	1.00	N/A	N/A
2001	Scheduled Minor	19.83	1.00		N/A	N/A	N/A	19.83	1.00	N/A	N/A
2002	Scheduled Minor	20.56	1.00		N/A	N/A	N/A	20.56	1.00	N/A	N/A
2003	Scheduled Minor	21.28	1.00		N/A	N/A	N/A	21.28	1.00	N/A	N/A
2004	Scheduled Minor	22.01	1.00		N/A	N/A	N/A	22.01	1.00	N/A	N/A
2005	Scheduled Minor	22.73	1.00		N/A	N/A	N/A	22.73	1.00	N/A	N/A
2006	Scheduled Minor	23.46	1.00		N/A	N/A	N/A	23.46	1.00	N/A	N/A
2007	Scheduled Minor	24.18	1.00		N/A	N/A	N/A	24.18	1.00	N/A	N/A
2008	Scheduled Minor	24.91	1.00		N/A	N/A	N/A	24.91	1.00	N/A	N/A
2009	Scheduled Minor	25.63	1.00		N/A	N/A	N/A	25.63	1.00	N/A	N/A
2010	Scheduled Minor	26.36	1.00		N/A	N/A	N/A	26.36	1.00	N/A	N/A
2011	Scheduled Minor	27.09	1.00		N/A	N/A	N/A	27.09	1.00	N/A	N/A
2012	Scheduled Minor	27.81	1.00		N/A	N/A	N/A	27.81	1.00	N/A	N/A
2013	Scheduled Minor	28.54	1.00		N/A	N/A	N/A	28.54	1.00	N/A	N/A
2014	Major Rehab	29.26	1.00		N/A	N/A	N/A	29.26	1.00	N/A	N/A
2015	Major Rehab	29.99	1.00	90	N/A	N/A	N/A	29.99	91.00	N/A	N/A
2016	Scheduled Minor	15.48	1.00		N/A	N/A	N/A	15.48	1.00	N/A	N/A
2017	Scheduled Minor	16.20	1.00		N/A	N/A	N/A	16.20	1.00	N/A	N/A
2018	Scheduled Minor	16.93	1.00		N/A	N/A	N/A	16.93	1.00	N/A	N/A
2019	Scheduled Minor	17.65	1.00		N/A	N/A	N/A	17.65	1.00	N/A	N/A
2020	Scheduled Minor	18.38	1.00		N/A	N/A	N/A	18.38	1.00	N/A	N/A
2021	Scheduled Minor	19.11	1.00		N/A	N/A	N/A	19.11	1.00	N/A	N/A
2022	Scheduled Minor	19.83	1.00		N/A	N/A	N/A	19.83	1.00	N/A	N/A
2023	Scheduled Minor	20.56	1.00		N/A	N/A	N/A	20.56	1.00	N/A	N/A
2024	Scheduled Minor	21.28	1.00		N/A	N/A	N/A	21.28	1.00	N/A	N/A
2025	Scheduled Minor	22.01	1.00		N/A	N/A	N/A	22.01	1.00	N/A	N/A
2026	Scheduled Minor	22.73	1.00		N/A	N/A	N/A	22.73	1.00	N/A	N/A
2027	Scheduled Minor	23.46	1.00		N/A	N/A	N/A	23.46	1.00	N/A	N/A
2028	Scheduled Minor	24.18	1.00		N/A	N/A	N/A	24.18	1.00	N/A	N/A
2029	Scheduled Minor	24.91	1.00		N/A	N/A	N/A	24.91	1.00	N/A	N/A
2030	Scheduled Minor	25.63	1.00		N/A	N/A	N/A	25.63	1.00	N/A	N/A
2031	Scheduled Minor	26.36	1.00		N/A	N/A	N/A	26.36	1.00	N/A	N/A
2032	Scheduled Minor	27.09	1.00		N/A	N/A	N/A	27.09	1.00	N/A	N/A
2033	Scheduled Minor	27.81	1.00		N/A	N/A	N/A	27.81	1.00	N/A	N/A
2034	Scheduled Minor	28.54	1.00		N/A	N/A	N/A	28.54	1.00	N/A	N/A
2035	Scheduled Minor	29.26	1.00		N/A	N/A	N/A	29.26	1.00	N/A	N/A
2036	Scheduled Minor	29.99	1.00		N/A	N/A	N/A	29.99	1.00	N/A	N/A
2037	Scheduled Minor	30.71	1.00		N/A	N/A	N/A	30.71	1.00	N/A	N/A
2038	Scheduled Minor	31.44	1.00		N/A	N/A	N/A	31.44	1.00	N/A	N/A
2039	Scheduled Minor	32.16	1.00		N/A	N/A	N/A	32.16	1.00	N/A	N/A
2040	Major Rehab	32.89	1.00	90	N/A	N/A	N/A	32.89	91.00	N/A	N/A
2041	Scheduled Minor	18.96	1.00		N/A	N/A	N/A	18.96	1.00	N/A	N/A
2042	Scheduled Minor	19.69	1.00		N/A	N/A	N/A	19.69	1.00	N/A	N/A
2043	Scheduled Minor	20.41	1.00		N/A	N/A	N/A	20.41	1.00	N/A	N/A
2044	Scheduled Minor	21.14	1.00		N/A	N/A	N/A	21.14	1.00	N/A	N/A
2045	Maint. Dewater	21.86	1.00		N/A	N/A	N/A	21.86	1.00	N/A	N/A
2046	Scheduled Minor	22.59	1.00		N/A	N/A	N/A	22.59	1.00	N/A	N/A
2047	Scheduled Minor	23.31	1.00		N/A	N/A	N/A	23.31	1.00	N/A	N/A
2048	Scheduled Minor	24.04	1.00		N/A	N/A	N/A	24.04	1.00	N/A	N/A
2049	Scheduled Minor	24.76	1.00		N/A	N/A	N/A	24.76	1.00	N/A	N/A
2050	Scheduled Minor	25.49	1.00		N/A	N/A	N/A	25.49	1.00	N/A	N/A
2051	Scheduled Minor	26.22	1.00		N/A	N/A	N/A	26.22	1.00	N/A	N/A
2052	Scheduled Minor	26.94	1.00		N/A	N/A	N/A	26.94	1.00	N/A	N/A
2053	Scheduled Minor	27.67	1.00		N/A	N/A	N/A	27.67	1.00	N/A	N/A
2054	Scheduled Minor	28.39	1.00		N/A	N/A	N/A	28.39	1.00	N/A	N/A
2055	Scheduled Minor	29.12	1.00		N/A	N/A	N/A	29.12	1.00	N/A	N/A
2056	Scheduled Minor	29.84	1.00		N/A	N/A	N/A	29.84	1.00	N/A	N/A
2057	Scheduled Minor	30.57	1.00		N/A	N/A	N/A	30.57	1.00	N/A	N/A
2058	Scheduled Minor	31.29	1.00		N/A	N/A	N/A	31.29	1.00	N/A	N/A
2059	Scheduled Minor	32.02	1.00		N/A	N/A	N/A	32.02	1.00	N/A	N/A
2060	Scheduled Minor	32.74	1.00		N/A	N/A	N/A	32.74	1.00	N/A	N/A
2061	Scheduled Minor	33.47	1.00		N/A	N/A	N/A	33.47	1.00	N/A	N/A
2062	Scheduled Minor	34.20	1.00		N/A	N/A	N/A	34.20	1.00	N/A	N/A
2063	Scheduled Minor	34.92	1.00		N/A	N/A	N/A	34.92	1.00	N/A	N/A
2064	Scheduled Minor	35.65	1.00		N/A	N/A	N/A	35.65	1.00	N/A	N/A
2065	Major Rehab	36.37	1.00	90	N/A	N/A	N/A	36.37	91.00	N/A	N/A
<b>Sum</b>		<b>1,689</b>	<b>66</b>	<b>270</b>				<b>1,689</b>	<b>336</b>		

1. Unscheduled closures from US Army Corps of Engineers, Navigation Data Center, Water Resources Support Center, 7701 Telegraph Rd., Casey Bldg. Alexandria, Virginia, 22315-3868. Data based on years 1994 to 1998. Average length of closure 12.5 hours.

2. Schedule closures estimated based on Navigation notices from the Rock Island District. From Years 1995 to 1998. In 4 years of data, L/D 20 was closed for a total 8 times for a total of 96 hours. Thus, an average scheduled closure time of 24 hours (1.0 Day) is assumed every year.

Lock and Dam 21 W/O Project										
Year	Main Chamber Closures (Days)			Auxiliary Chamber Closures			Project Summary			
	Maint. Item	Unsched Closures	Scheduled Closures <sup>2</sup>	Maint. Item	Unsched Closures	Scheduled Closures	Main	Aux		
		Random	Cyclical Maintenance		Random Minor	Cyclical Maintenance		Un-sched	Sched	Un-sched
2000	Scheduled Minor	9.35	1.60		N/A	N/A	9.35	1.60	N/A	N/A
2001	Scheduled Minor	10.08	1.60		N/A	N/A	10.08	1.60	N/A	N/A
2002	Scheduled Minor	10.82	1.60		N/A	N/A	10.82	1.60	N/A	N/A
2003	Scheduled Minor	11.55	1.60		N/A	N/A	11.55	1.60	N/A	N/A
2004	Scheduled Minor	12.29	1.60		N/A	N/A	12.29	1.60	N/A	N/A
2005	Scheduled Minor	13.02	1.60		N/A	N/A	13.02	1.60	N/A	N/A
2006	Scheduled Minor	13.76	1.60		N/A	N/A	13.76	1.60	N/A	N/A
2007	Scheduled Minor	14.49	1.60		N/A	N/A	14.49	1.60	N/A	N/A
2008	Scheduled Minor	15.23	1.60		N/A	N/A	15.23	1.60	N/A	N/A
2009	Scheduled Minor	15.96	1.60		N/A	N/A	15.96	1.60	N/A	N/A
2010	Scheduled Minor	16.70	1.60		N/A	N/A	16.70	1.60	N/A	N/A
2011	Scheduled Minor	17.43	1.60		N/A	N/A	17.43	1.60	N/A	N/A
2012	Scheduled Minor	18.17	1.60		N/A	N/A	18.17	1.60	N/A	N/A
2013	Scheduled Minor	18.90	1.60		N/A	N/A	18.90	1.60	N/A	N/A
2014	Major Rehab	19.64	1.60	90	N/A	N/A	19.64	1.60	N/A	N/A
2015	Major Rehab	20.37	1.60	90	N/A	N/A	20.37	91.60	N/A	N/A
2016	Scheduled Minor	5.67	1.60		N/A	N/A	5.67	1.60	N/A	N/A
2017	Scheduled Minor	6.41	1.60		N/A	N/A	6.41	1.60	N/A	N/A
2018	Scheduled Minor	7.14	1.60		N/A	N/A	7.14	1.60	N/A	N/A
2019	Scheduled Minor	7.88	1.60		N/A	N/A	7.88	1.60	N/A	N/A
2020	Scheduled Minor	8.61	1.60		N/A	N/A	8.61	1.60	N/A	N/A
2021	Scheduled Minor	9.35	1.60		N/A	N/A	9.35	1.60	N/A	N/A
2022	Scheduled Minor	10.08	1.60		N/A	N/A	10.08	1.60	N/A	N/A
2023	Scheduled Minor	10.82	1.60		N/A	N/A	10.82	1.60	N/A	N/A
2024	Scheduled Minor	11.55	1.60		N/A	N/A	11.55	1.60	N/A	N/A
2025	Scheduled Minor	12.29	1.60		N/A	N/A	12.29	1.60	N/A	N/A
2026	Scheduled Minor	13.02	1.60		N/A	N/A	13.02	1.60	N/A	N/A
2027	Scheduled Minor	13.76	1.60		N/A	N/A	13.76	1.60	N/A	N/A
2028	Scheduled Minor	14.49	1.60		N/A	N/A	14.49	1.60	N/A	N/A
2029	Scheduled Minor	15.23	1.60		N/A	N/A	15.23	1.60	N/A	N/A
2030	Scheduled Minor	15.96	1.60		N/A	N/A	15.96	1.60	N/A	N/A
2031	Scheduled Minor	16.70	1.60		N/A	N/A	16.70	1.60	N/A	N/A
2032	Scheduled Minor	17.43	1.60		N/A	N/A	17.43	1.60	N/A	N/A
2033	Scheduled Minor	18.17	1.60		N/A	N/A	18.17	1.60	N/A	N/A
2034	Scheduled Minor	18.90	1.60		N/A	N/A	18.90	1.60	N/A	N/A
2035	Scheduled Minor	19.64	1.60		N/A	N/A	19.64	1.60	N/A	N/A
2036	Scheduled Minor	20.37	1.60		N/A	N/A	20.37	1.60	N/A	N/A
2037	Scheduled Minor	21.11	1.60		N/A	N/A	21.11	1.60	N/A	N/A
2038	Scheduled Minor	21.84	1.60		N/A	N/A	21.84	1.60	N/A	N/A
2039	Scheduled Minor	22.58	1.60		N/A	N/A	22.58	1.60	N/A	N/A
2040	Major Rehab	23.31	1.60	90	N/A	N/A	23.31	91.60	N/A	N/A
2041	Scheduled Minor	9.20	1.60		N/A	N/A	9.20	1.60	N/A	N/A
2042	Scheduled Minor	9.94	1.60		N/A	N/A	9.94	1.60	N/A	N/A
2043	Scheduled Minor	10.67	1.60		N/A	N/A	10.67	1.60	N/A	N/A
2044	Scheduled Minor	11.41	1.60		N/A	N/A	11.41	1.60	N/A	N/A
2045	Maint. Dewater	12.14	1.60		N/A	N/A	12.14	1.60	N/A	N/A
2046	Scheduled Minor	12.88	1.60		N/A	N/A	12.88	1.60	N/A	N/A
2047	Scheduled Minor	13.61	1.60		N/A	N/A	13.61	1.60	N/A	N/A
2048	Scheduled Minor	14.35	1.60		N/A	N/A	14.35	1.60	N/A	N/A
2049	Scheduled Minor	15.08	1.60		N/A	N/A	15.08	1.60	N/A	N/A
2050	Scheduled Minor	15.82	1.60		N/A	N/A	15.82	1.60	N/A	N/A
2051	Scheduled Minor	16.55	1.60		N/A	N/A	16.55	1.60	N/A	N/A
2052	Scheduled Minor	17.29	1.60		N/A	N/A	17.29	1.60	N/A	N/A
2053	Scheduled Minor	18.02	1.60		N/A	N/A	18.02	1.60	N/A	N/A
2054	Scheduled Minor	18.76	1.60		N/A	N/A	18.76	1.60	N/A	N/A
2055	Scheduled Minor	19.49	1.60		N/A	N/A	19.49	1.60	N/A	N/A
2056	Scheduled Minor	20.23	1.60		N/A	N/A	20.23	1.60	N/A	N/A
2057	Scheduled Minor	20.96	1.60		N/A	N/A	20.96	1.60	N/A	N/A
2058	Scheduled Minor	21.70	1.60		N/A	N/A	21.70	1.60	N/A	N/A
2059	Scheduled Minor	22.43	1.60		N/A	N/A	22.43	1.60	N/A	N/A
2060	Scheduled Minor	23.17	1.60		N/A	N/A	23.17	1.60	N/A	N/A
2061	Scheduled Minor	23.90	1.60		N/A	N/A	23.90	1.60	N/A	N/A
2062	Scheduled Minor	24.63	1.60		N/A	N/A	24.63	1.60	N/A	N/A
2063	Scheduled Minor	25.37	1.60		N/A	N/A	25.37	1.60	N/A	N/A
2064	Scheduled Minor	26.10	1.60		N/A	N/A	26.10	1.60	N/A	N/A
2065	Major Rehab	26.84	1.60	90	N/A	N/A	26.84	91.60	N/A	N/A
<b>Sum</b>		<b>1,051</b>	<b>106</b>	<b>270</b>			<b>1,051</b>	<b>376</b>		

1. Unscheduled closures from US Army Corps of Engineers, Navigation Data Center, Water Resources Support Center, 7701 Telegraph Rd., Casey Bldg. Alexandria, Virginia, 22315-3868. Data based from years 1994 to 1998. Average length of closure hours 9.7 hours.

2. Schedule closures estimated based on Navigation notices from the Rock Island District. From Years 1995 to 1998. In 4 years of data, L/D 21 was closed 10 times for a total of 153 hours. Thus, an average scheduled closure time of 38.25 hours ( 1.6 Days) is assumed each year.

Lock and Dam 22 W/O Project										
Year	Main Chamber Closures (Days)			Auxiliary Chamber Closures			Project Summary			
	Maint. Item	Unsched Closures	Scheduled Closures <sup>2</sup>	Maint. Item	Unsched Closures	Scheduled Closures	Main	Aux		
		Random	Cyclical Maintenance		Random Minor	Cyclical Maintenance	Un-sched	Sched	Un-sched	Sched
2000	Scheduled Minor	14.12	0.83		N/A	N/A	14.12	0.83	N/A	N/A
2001	Scheduled Minor	15.18	0.83		N/A	N/A	15.18	0.83	N/A	N/A
2002	Scheduled Minor	16.24	0.83		N/A	N/A	16.24	0.83	N/A	N/A
2003	Scheduled Minor	17.30	0.83		N/A	N/A	17.30	0.83	N/A	N/A
2004	Scheduled Minor	18.37	0.83		N/A	N/A	18.37	0.83	N/A	N/A
2005	Scheduled Minor	19.43	0.83		N/A	N/A	19.43	0.83	N/A	N/A
2006	Scheduled Minor	20.49	0.83		N/A	N/A	20.49	0.83	N/A	N/A
2007	Scheduled Minor	21.55	0.83		N/A	N/A	21.55	0.83	N/A	N/A
2008	Scheduled Minor	22.61	0.83		N/A	N/A	22.61	0.83	N/A	N/A
2009	Scheduled Minor	23.67	0.83		N/A	N/A	23.67	0.83	N/A	N/A
2010	Scheduled Minor	24.74	0.83		N/A	N/A	24.74	0.83	N/A	N/A
2011	Scheduled Minor	25.80	0.83		N/A	N/A	25.80	0.83	N/A	N/A
2012	Scheduled Minor	26.86	0.83		N/A	N/A	26.86	0.83	N/A	N/A
2013	Scheduled Minor	27.92	0.83		N/A	N/A	27.92	0.83	N/A	N/A
2014	Major Rehab	28.98	0.83		N/A	N/A	28.98	0.83	N/A	N/A
2015	Major Rehab	30.04	0.83	90	N/A	N/A	30.04	90.83	N/A	N/A
2016	Scheduled Minor	8.81	0.83		N/A	N/A	8.81	0.83	N/A	N/A
2017	Scheduled Minor	9.87	0.83		N/A	N/A	9.87	0.83	N/A	N/A
2018	Scheduled Minor	10.93	0.83		N/A	N/A	10.93	0.83	N/A	N/A
2019	Scheduled Minor	11.99	0.83		N/A	N/A	11.99	0.83	N/A	N/A
2020	Scheduled Minor	13.06	0.83		N/A	N/A	13.06	0.83	N/A	N/A
2021	Scheduled Minor	14.12	0.83		N/A	N/A	14.12	0.83	N/A	N/A
2022	Scheduled Minor	15.18	0.83		N/A	N/A	15.18	0.83	N/A	N/A
2023	Scheduled Minor	16.24	0.83		N/A	N/A	16.24	0.83	N/A	N/A
2024	Scheduled Minor	17.30	0.83		N/A	N/A	17.30	0.83	N/A	N/A
2025	Scheduled Minor	18.37	0.83		N/A	N/A	18.37	0.83	N/A	N/A
2026	Scheduled Minor	19.43	0.83		N/A	N/A	19.43	0.83	N/A	N/A
2027	Scheduled Minor	20.49	0.83		N/A	N/A	20.49	0.83	N/A	N/A
2028	Scheduled Minor	21.55	0.83		N/A	N/A	21.55	0.83	N/A	N/A
2029	Scheduled Minor	22.61	0.83		N/A	N/A	22.61	0.83	N/A	N/A
2030	Scheduled Minor	23.67	0.83		N/A	N/A	23.67	0.83	N/A	N/A
2031	Scheduled Minor	24.74	0.83		N/A	N/A	24.74	0.83	N/A	N/A
2032	Scheduled Minor	25.80	0.83		N/A	N/A	25.80	0.83	N/A	N/A
2033	Scheduled Minor	26.86	0.83		N/A	N/A	26.86	0.83	N/A	N/A
2034	Scheduled Minor	27.92	0.83		N/A	N/A	27.92	0.83	N/A	N/A
2035	Scheduled Minor	28.98	0.83		N/A	N/A	28.98	0.83	N/A	N/A
2036	Scheduled Minor	30.04	0.83		N/A	N/A	30.04	0.83	N/A	N/A
2037	Scheduled Minor	31.11	0.83		N/A	N/A	31.11	0.83	N/A	N/A
2038	Scheduled Minor	32.17	0.83		N/A	N/A	32.17	0.83	N/A	N/A
2039	Scheduled Minor	33.23	0.83		N/A	N/A	33.23	0.83	N/A	N/A
2040	Major Rehab	34.29	0.83	90	N/A	N/A	34.29	90.83	N/A	N/A
2041	Scheduled Minor	13.91	0.83		N/A	N/A	13.91	0.83	N/A	N/A
2042	Scheduled Minor	14.97	0.83		N/A	N/A	14.97	0.83	N/A	N/A
2043	Scheduled Minor	16.03	0.83		N/A	N/A	16.03	0.83	N/A	N/A
2044	Scheduled Minor	17.09	0.83		N/A	N/A	17.09	0.83	N/A	N/A
2045	Maint. Dewater	18.15	0.83		N/A	N/A	18.15	0.83	N/A	N/A
2046	Scheduled Minor	19.21	0.83		N/A	N/A	19.21	0.83	N/A	N/A
2047	Scheduled Minor	20.28	0.83		N/A	N/A	20.28	0.83	N/A	N/A
2048	Scheduled Minor	21.34	0.83		N/A	N/A	21.34	0.83	N/A	N/A
2049	Scheduled Minor	22.40	0.83		N/A	N/A	22.40	0.83	N/A	N/A
2050	Scheduled Minor	23.46	0.83		N/A	N/A	23.46	0.83	N/A	N/A
2051	Scheduled Minor	24.52	0.83		N/A	N/A	24.52	0.83	N/A	N/A
2052	Scheduled Minor	25.59	0.83		N/A	N/A	25.59	0.83	N/A	N/A
2053	Scheduled Minor	26.65	0.83		N/A	N/A	26.65	0.83	N/A	N/A
2054	Scheduled Minor	27.71	0.83		N/A	N/A	27.71	0.83	N/A	N/A
2055	Scheduled Minor	28.77	0.83		N/A	N/A	28.77	0.83	N/A	N/A
2056	Scheduled Minor	29.83	0.83		N/A	N/A	29.83	0.83	N/A	N/A
2057	Scheduled Minor	30.89	0.83		N/A	N/A	30.89	0.83	N/A	N/A
2058	Scheduled Minor	31.96	0.83		N/A	N/A	31.96	0.83	N/A	N/A
2059	Scheduled Minor	33.02	0.83		N/A	N/A	33.02	0.83	N/A	N/A
2060	Scheduled Minor	34.08	0.83		N/A	N/A	34.08	0.83	N/A	N/A
2061	Scheduled Minor	35.14	0.83		N/A	N/A	35.14	0.83	N/A	N/A
2062	Scheduled Minor	36.20	0.83		N/A	N/A	36.20	0.83	N/A	N/A
2063	Scheduled Minor	37.26	0.83		N/A	N/A	37.26	0.83	N/A	N/A
2064	Scheduled Minor	38.33	0.83		N/A	N/A	38.33	0.83	N/A	N/A
2065	Major Rehab	39.39	0.83	90	N/A	N/A	39.39	90.83	N/A	N/A
<b>Sum</b>		<b>1,558</b>	<b>55</b>	<b>270</b>			<b>1,558</b>	<b>325</b>		

1. Unscheduled closures from US Army Corps of Engineers, Navigation Data Center, Water Resources Support Center, 7701 Telegraph Rd., Casey Bldg. Alexandria, Virginia, 22315-3868. Data based on years 1994 to 1998. Average length of closure 5.7 hours.

2. Schedule closures estimated based on Navigation notices from the Rock Island District. From Years 1995 to 1998. In 4 years of data, L/D 22 was closed for a total 7 times for a total of 80 hours. Thus, an average scheduled closure time of 20 hours (0.83 Days) is assumed every year.

Lock and Dam 24 W/O Project											
Year	Main Chamber Closures (Days)			Auxiliary Chamber Closures			Project Summary				
	Maint. Item	Unsched Closures	Scheduled Closures <sup>2</sup>	Maint. Item	Unsched Closures	Scheduled Closures	Main	Aux			
		Random	Cyclical Maintenance		Random Minor	Cyclical Maintenance		Un-sched	Sched	Un-sched	Sched
2000	Scheduled Minor	9.92	1.67		N/A	N/A	N/A	9.92	1.67	N/A	N/A
2001	Scheduled Minor	10.71	1.67		N/A	N/A	N/A	10.71	1.67	N/A	N/A
2002	Scheduled Minor	11.51	1.67		N/A	N/A	N/A	11.51	1.67	N/A	N/A
2003	Scheduled Minor	12.30	1.67		N/A	N/A	N/A	12.30	1.67	N/A	N/A
2004	Scheduled Minor	13.09	1.67		N/A	N/A	N/A	13.09	1.67	N/A	N/A
2005	Scheduled Minor	13.88	1.67		N/A	N/A	N/A	13.88	1.67	N/A	N/A
2006	Scheduled Minor	14.68	1.67		N/A	N/A	N/A	14.68	1.67	N/A	N/A
2007	Scheduled Minor	15.47	1.67		N/A	N/A	N/A	15.47	1.67	N/A	N/A
2008	Scheduled Minor	16.26	1.67		N/A	N/A	N/A	16.26	1.67	N/A	N/A
2009	Scheduled Minor	17.05	1.67		N/A	N/A	N/A	17.05	1.67	N/A	N/A
2010	Scheduled Minor	17.84	1.67		N/A	N/A	N/A	17.84	1.67	N/A	N/A
2011	Scheduled Minor	18.64	1.67		N/A	N/A	N/A	18.64	1.67	N/A	N/A
2012	Scheduled Minor	19.43	1.67		N/A	N/A	N/A	19.43	1.67	N/A	N/A
2013	Scheduled Minor	20.22	1.67		N/A	N/A	N/A	20.22	1.67	N/A	N/A
2014	Major Rehab	21.01	1.67		N/A	N/A	N/A	21.01	1.67	N/A	N/A
2015	Major Rehab	21.81	1.67		N/A	N/A	N/A	21.81	1.67	N/A	N/A
2016	Scheduled Minor	22.60	1.67		N/A	N/A	N/A	22.60	1.67	N/A	N/A
2017	Scheduled Minor	23.39	1.67		N/A	N/A	N/A	23.39	1.67	N/A	N/A
2018	Scheduled Minor	24.18	1.67		N/A	N/A	N/A	24.18	1.67	N/A	N/A
2019	Scheduled Minor	24.97	1.67		N/A	N/A	N/A	24.97	1.67	N/A	N/A
2020	Scheduled Minor	6.75	1.67	90	N/A	N/A	N/A	6.75	91.67	N/A	N/A
2021	Scheduled Minor	7.55	1.67		N/A	N/A	N/A	7.55	1.67	N/A	N/A
2022	Scheduled Minor	7.55	1.67		N/A	N/A	N/A	7.55	1.67	N/A	N/A
2023	Scheduled Minor	8.34	1.67		N/A	N/A	N/A	8.34	1.67	N/A	N/A
2024	Scheduled Minor	9.13	1.67		N/A	N/A	N/A	9.13	1.67	N/A	N/A
2025	Scheduled Minor	9.92	1.67		N/A	N/A	N/A	9.92	1.67	N/A	N/A
2026	Scheduled Minor	10.71	1.67		N/A	N/A	N/A	10.71	1.67	N/A	N/A
2027	Scheduled Minor	11.51	1.67		N/A	N/A	N/A	11.51	1.67	N/A	N/A
2028	Scheduled Minor	12.30	1.67		N/A	N/A	N/A	12.30	1.67	N/A	N/A
2029	Scheduled Minor	13.09	1.67		N/A	N/A	N/A	13.09	1.67	N/A	N/A
2030	Scheduled Minor	13.88	1.67		N/A	N/A	N/A	13.88	1.67	N/A	N/A
2031	Scheduled Minor	14.68	1.67		N/A	N/A	N/A	14.68	1.67	N/A	N/A
2032	Scheduled Minor	15.47	1.67		N/A	N/A	N/A	15.47	1.67	N/A	N/A
2033	Scheduled Minor	16.26	1.67		N/A	N/A	N/A	16.26	1.67	N/A	N/A
2034	Scheduled Minor	17.05	1.67		N/A	N/A	N/A	17.05	1.67	N/A	N/A
2035	Scheduled Minor	17.84	1.67		N/A	N/A	N/A	17.84	1.67	N/A	N/A
2036	Scheduled Minor	18.64	1.67		N/A	N/A	N/A	18.64	1.67	N/A	N/A
2037	Scheduled Minor	19.43	1.67		N/A	N/A	N/A	19.43	1.67	N/A	N/A
2038	Scheduled Minor	20.22	1.67		N/A	N/A	N/A	20.22	1.67	N/A	N/A
2039	Scheduled Minor	21.01	1.67		N/A	N/A	N/A	21.01	1.67	N/A	N/A
2040	Major Rehab	21.81	1.67		N/A	N/A	N/A	21.81	1.67	N/A	N/A
2041	Scheduled Minor	22.60	1.67		N/A	N/A	N/A	22.60	1.67	N/A	N/A
2042	Scheduled Minor	23.39	1.67		N/A	N/A	N/A	23.39	1.67	N/A	N/A
2043	Scheduled Minor	24.18	1.67		N/A	N/A	N/A	24.18	1.67	N/A	N/A
2044	Scheduled Minor	24.97	1.67		N/A	N/A	N/A	24.97	1.67	N/A	N/A
2045	Maint. Dewater	10.40	1.67	90	N/A	N/A	N/A	10.40	91.67	N/A	N/A
2046	Scheduled Minor	11.19	1.67		N/A	N/A	N/A	11.19	1.67	N/A	N/A
2047	Scheduled Minor	11.98	1.67		N/A	N/A	N/A	11.98	1.67	N/A	N/A
2048	Scheduled Minor	12.77	1.67		N/A	N/A	N/A	12.77	1.67	N/A	N/A
2049	Scheduled Minor	13.57	1.67		N/A	N/A	N/A	13.57	1.67	N/A	N/A
2050	Scheduled Minor	14.36	1.67		N/A	N/A	N/A	14.36	1.67	N/A	N/A
2051	Scheduled Minor	15.15	1.67		N/A	N/A	N/A	15.15	1.67	N/A	N/A
2052	Scheduled Minor	15.94	1.67		N/A	N/A	N/A	15.94	1.67	N/A	N/A
2053	Scheduled Minor	16.74	1.67		N/A	N/A	N/A	16.74	1.67	N/A	N/A
2054	Scheduled Minor	17.53	1.67		N/A	N/A	N/A	17.53	1.67	N/A	N/A
2055	Scheduled Minor	18.32	1.67		N/A	N/A	N/A	18.32	1.67	N/A	N/A
2056	Scheduled Minor	19.11	1.67		N/A	N/A	N/A	19.11	1.67	N/A	N/A
2057	Scheduled Minor	19.90	1.67		N/A	N/A	N/A	19.90	1.67	N/A	N/A
2058	Scheduled Minor	20.70	1.67		N/A	N/A	N/A	20.70	1.67	N/A	N/A
2059	Scheduled Minor	21.49	1.67		N/A	N/A	N/A	21.49	1.67	N/A	N/A
2060	Scheduled Minor	22.28	1.67		N/A	N/A	N/A	22.28	1.67	N/A	N/A
2061	Scheduled Minor	23.07	1.67		N/A	N/A	N/A	23.07	1.67	N/A	N/A
2062	Scheduled Minor	23.86	1.67		N/A	N/A	N/A	23.86	1.67	N/A	N/A
2063	Scheduled Minor	24.66	1.67		N/A	N/A	N/A	24.66	1.67	N/A	N/A
2064	Scheduled Minor	25.45	1.67		N/A	N/A	N/A	25.45	1.67	N/A	N/A
2065	Major Rehab	26.24	1.67		N/A	N/A	N/A	26.24	1.67	N/A	N/A
<b>Sum</b>		<b>1,122</b>	<b>110</b>					<b>1,122</b>	<b>290</b>		

1. Unscheduled closures from US Army Corps of Engineers, Navigation Data Center, Water Resources Support Center, 7701 Telegraph Rd., Casey Bldg. Alexandria, Virginia, 22315-3868. Data based on years 1994 to 1998. Average length of closure 3.34 hours.

2. Schedule closures estimated based on Navigation notices from the Rock Island District. From Years 1995 to 1998. In 4 years of data, L/D 24 was closed for a total of 160 hours. Thus, an average scheduled closure time of 40 hours (1.67 Days) is assumed every year.

Lock and Dam 25 W/O Project											
Year	Main Chamber Closures (Days)			Auxiliary Chamber Closures			Project Summary				
	Maint. Item	Unsched Closures	Scheduled Closures <sup>2</sup>	Maint. Item	Unsched Closures	Scheduled Closures	Main	Aux			
		Random	Cyclical Maintenance		Random Minor	Cyclical Maintenance		Un-sched	Sched	Un-sched	Sched
2000	Scheduled Minor	7.68	3.97		N/A	N/A	N/A	7.68	3.97	N/A	N/A
2001	Scheduled Minor	8.25	3.97		N/A	N/A	N/A	8.25	3.97	N/A	N/A
2002	Scheduled Minor	8.82	3.97		N/A	N/A	N/A	8.82	3.97	N/A	N/A
2003	Scheduled Minor	9.38	3.97		N/A	N/A	N/A	9.38	3.97	N/A	N/A
2004	Scheduled Minor	9.95	3.97		N/A	N/A	N/A	9.95	3.97	N/A	N/A
2005	Scheduled Minor	10.52	3.97		N/A	N/A	N/A	10.52	3.97	N/A	N/A
2006	Scheduled Minor	11.09	3.97		N/A	N/A	N/A	11.09	3.97	N/A	N/A
2007	Scheduled Minor	11.66	3.97		N/A	N/A	N/A	11.66	3.97	N/A	N/A
2008	Scheduled Minor	12.22	3.97		N/A	N/A	N/A	12.22	3.97	N/A	N/A
2009	Scheduled Minor	12.79	3.97		N/A	N/A	N/A	12.79	3.97	N/A	N/A
2010	Scheduled Minor	13.36	3.97		N/A	N/A	N/A	13.36	3.97	N/A	N/A
2011	Scheduled Minor	13.93	3.97		N/A	N/A	N/A	13.93	3.97	N/A	N/A
2012	Scheduled Minor	14.50	3.97		N/A	N/A	N/A	14.50	3.97	N/A	N/A
2013	Scheduled Minor	15.06	3.97		N/A	N/A	N/A	15.06	3.97	N/A	N/A
2014	Scheduled Minor	15.63	3.97		N/A	N/A	N/A	15.63	3.97	N/A	N/A
2015	Major Rehab	16.20	3.97		N/A	N/A	N/A	16.20	3.97	N/A	N/A
2016	Scheduled Minor	16.77	3.97		N/A	N/A	N/A	16.77	3.97	N/A	N/A
2017	Scheduled Minor	17.33	3.97		N/A	N/A	N/A	17.33	3.97	N/A	N/A
2018	Scheduled Minor	17.90	3.97		N/A	N/A	N/A	17.90	3.97	N/A	N/A
2019	Scheduled Minor	18.47	3.97		N/A	N/A	N/A	18.47	3.97	N/A	N/A
2020	Scheduled Minor	19.04	3.97	90	N/A	N/A	N/A	19.04	3.97	N/A	N/A
2021	Scheduled Minor	7.68	3.97		N/A	N/A	N/A	7.68	93.97	N/A	N/A
2022	Scheduled Minor	8.25	3.97		N/A	N/A	N/A	8.25	3.97	N/A	N/A
2023	Scheduled Minor	8.82	3.97		N/A	N/A	N/A	8.82	3.97	N/A	N/A
2024	Scheduled Minor	9.38	3.97		N/A	N/A	N/A	9.38	3.97	N/A	N/A
2025	Scheduled Minor	9.95	3.97		N/A	N/A	N/A	9.95	3.97	N/A	N/A
2026	Scheduled Minor	10.52	3.97		N/A	N/A	N/A	10.52	3.97	N/A	N/A
2027	Scheduled Minor	11.09	3.97		N/A	N/A	N/A	11.09	3.97	N/A	N/A
2028	Scheduled Minor	11.66	3.97		N/A	N/A	N/A	11.66	3.97	N/A	N/A
2029	Scheduled Minor	12.22	3.97		N/A	N/A	N/A	12.22	3.97	N/A	N/A
2030	Scheduled Minor	12.79	3.97		N/A	N/A	N/A	12.79	3.97	N/A	N/A
2031	Scheduled Minor	13.36	3.97		N/A	N/A	N/A	13.36	3.97	N/A	N/A
2032	Scheduled Minor	13.93	3.97		N/A	N/A	N/A	13.93	3.97	N/A	N/A
2033	Scheduled Minor	14.50	3.97		N/A	N/A	N/A	14.50	3.97	N/A	N/A
2034	Scheduled Minor	15.06	3.97		N/A	N/A	N/A	15.06	3.97	N/A	N/A
2035	Scheduled Minor	15.63	3.97		N/A	N/A	N/A	15.63	3.97	N/A	N/A
2036	Scheduled Minor	16.20	3.97		N/A	N/A	N/A	16.20	3.97	N/A	N/A
2037	Scheduled Minor	16.77	3.97		N/A	N/A	N/A	16.77	3.97	N/A	N/A
2038	Scheduled Minor	17.33	3.97		N/A	N/A	N/A	17.33	3.97	N/A	N/A
2039	Scheduled Minor	17.90	3.97		N/A	N/A	N/A	17.90	3.97	N/A	N/A
2040	Major Rehab	18.47	3.97		N/A	N/A	N/A	18.47	3.97	N/A	N/A
2041	Scheduled Minor	19.04	3.97		N/A	N/A	N/A	19.04	3.97	N/A	N/A
2042	Scheduled Minor	19.61	3.97		N/A	N/A	N/A	19.61	3.97	N/A	N/A
2043	Scheduled Minor	20.17	3.97		N/A	N/A	N/A	20.17	3.97	N/A	N/A
2044	Scheduled Minor	20.74	3.97		N/A	N/A	N/A	20.74	3.97	N/A	N/A
2045	Maint. Dewater	21.31	3.97		N/A	N/A	N/A	21.31	3.97	N/A	N/A
2046	Scheduled Minor	10.41	3.97	90	N/A	N/A	N/A	10.41	93.97	N/A	N/A
2047	Scheduled Minor	10.97	3.97		N/A	N/A	N/A	10.97	3.97	N/A	N/A
2048	Scheduled Minor	11.54	3.97		N/A	N/A	N/A	11.54	3.97	N/A	N/A
2049	Scheduled Minor	12.11	3.97		N/A	N/A	N/A	12.11	3.97	N/A	N/A
2050	Scheduled Minor	12.68	3.97		N/A	N/A	N/A	12.68	3.97	N/A	N/A
2051	Scheduled Minor	13.25	3.97		N/A	N/A	N/A	13.25	3.97	N/A	N/A
2052	Scheduled Minor	13.81	3.97		N/A	N/A	N/A	13.81	3.97	N/A	N/A
2053	Scheduled Minor	14.38	3.97		N/A	N/A	N/A	14.38	3.97	N/A	N/A
2054	Scheduled Minor	14.95	3.97		N/A	N/A	N/A	14.95	3.97	N/A	N/A
2055	Scheduled Minor	15.52	3.97		N/A	N/A	N/A	15.52	3.97	N/A	N/A
2056	Scheduled Minor	16.09	3.97		N/A	N/A	N/A	16.09	3.97	N/A	N/A
2057	Scheduled Minor	16.65	3.97		N/A	N/A	N/A	16.65	3.97	N/A	N/A
2058	Scheduled Minor	17.22	3.97		N/A	N/A	N/A	17.22	3.97	N/A	N/A
2059	Scheduled Minor	17.79	3.97		N/A	N/A	N/A	17.79	3.97	N/A	N/A
2060	Scheduled Minor	18.36	3.97		N/A	N/A	N/A	18.36	3.97	N/A	N/A
2061	Scheduled Minor	18.93	3.97		N/A	N/A	N/A	18.93	3.97	N/A	N/A
2062	Scheduled Minor	19.49	3.97		N/A	N/A	N/A	19.49	3.97	N/A	N/A
2063	Scheduled Minor	20.06	3.97		N/A	N/A	N/A	20.06	3.97	N/A	N/A
2064	Scheduled Minor	20.63	3.97		N/A	N/A	N/A	20.63	3.97	N/A	N/A
2065	Major Rehab	21.20	3.97		N/A	N/A	N/A	21.20	3.97	N/A	N/A
<b>Sum</b>		<b>959</b>	<b>262</b>	<b>180</b>				<b>959</b>	<b>442</b>		

1. Unscheduled closures from US Army Corps of Engineers, Navigation Data Center, Water Resources Support Center, 7701 Telegraph Rd., Casey Bldg. Alexandria, Virginia, 22315-3868. Data based on years 1994 to 1998. Average length of closure 5.94 hours.

2. Schedule closures estimated based on Navigation notices from the Rock Island District. From Years 1995 to 1998. In 4 years of data, L/D 25 was closed for a total of 383.28 hours. Thus, an average scheduled closure time of 95.8 hours (3.97 Days) is assumed every year.

Peoria Lock and Dam W/O Project										
Year	Main Chamber Closures (Days)			Auxiliary Chamber Closures			Project Summary			
	Maint. Item	Unsched Closures	Scheduled Closures	Maint. Item	Unsched Closures	Scheduled Closures	Random Minor	Cyclical Maintenance	Major Rehab	Main
		Random	Cyclical Maintenance		Random	Scheduled Closures	Un-sched	Sched	Un-sched	Aux
2000		4.61			N/A	N/A	N/A	4.61		N/A
2001	Scheduled Minor	4.87	2.00		N/A	N/A	N/A	4.87	2.00	N/A
2002		5.13			N/A	N/A	N/A	5.13		N/A
2003	Scheduled Minor	5.39	2.00		N/A	N/A	N/A	5.39	2.00	N/A
2004		5.65			N/A	N/A	N/A	5.65		N/A
2005	Scheduled Minor	5.92	2.00		N/A	N/A	N/A	5.92	2.00	N/A
2006		6.18			N/A	N/A	N/A	6.18		N/A
2007	Scheduled Minor	6.44	2.00		N/A	N/A	N/A	6.44	2.00	N/A
2008		6.70			N/A	N/A	N/A	6.70		N/A
2009	Scheduled Minor	6.96	2.00		N/A	N/A	N/A	6.96	2.00	N/A
2010		7.22			N/A	N/A	N/A	7.22		N/A
2011	Scheduled Minor	7.48	2.00		N/A	N/A	N/A	7.48	2.00	N/A
2012		7.74			N/A	N/A	N/A	7.74		N/A
2013	Scheduled Minor	8.00	2.00		N/A	N/A	N/A	8.00	2.00	N/A
2014		8.26			N/A	N/A	N/A	8.26		N/A
2015	Major Rehab	8.53		90			N/A	N/A	90.00	N/A
2016		3.31			N/A	N/A	N/A	3.31		N/A
2017	Scheduled Minor	3.57	2.00		N/A	N/A	N/A	3.57	2.00	N/A
2018		3.83			N/A	N/A	N/A	3.83		N/A
2019	Scheduled Minor	4.09	2.00		N/A	N/A	N/A	4.09	2.00	N/A
2020		4.35			N/A	N/A	N/A	4.35		N/A
2021	Scheduled Minor	4.61	2.00		N/A	N/A	N/A	4.61	2.00	N/A
2022		4.87			N/A	N/A	N/A	4.87		N/A
2023	Scheduled Minor	5.13	2.00		N/A	N/A	N/A	5.13	2.00	N/A
2024		5.39			N/A	N/A	N/A	5.39		N/A
2025	Scheduled Minor	5.65	2.00		N/A	N/A	N/A	5.65	2.00	N/A
2026		5.92			N/A	N/A	N/A	5.92		N/A
2027	Scheduled Minor	6.18	2.00		N/A	N/A	N/A	6.18	2.00	N/A
2028		6.44			N/A	N/A	N/A	6.44		N/A
2029	Scheduled Minor	6.70	2.00		N/A	N/A	N/A	6.70	2.00	N/A
2030		6.96			N/A	N/A	N/A	6.96		N/A
2031	Scheduled Minor	7.22	2.00		N/A	N/A	N/A	7.22	2.00	N/A
2032		7.48			N/A	N/A	N/A	7.48		N/A
2033	Scheduled Minor	7.74	2.00		N/A	N/A	N/A	7.74	2.00	N/A
2034		8.00			N/A	N/A	N/A	8.00		N/A
2035	Scheduled Minor	8.26	2.00		N/A	N/A	N/A	8.26	2.00	N/A
2036		8.53			N/A	N/A	N/A	8.53		N/A
2037	Scheduled Minor	8.79	2.00		N/A	N/A	N/A	8.79	2.00	N/A
2038		9.05			N/A	N/A	N/A	9.05		N/A
2039	Scheduled Minor	9.31	2.00		N/A	N/A	N/A	9.31	2.00	N/A
2040		9.57		90			N/A	N/A	90.00	N/A
2041	Scheduled Minor	4.56	2.00		N/A	N/A	N/A	4.56	2.00	N/A
2042		4.82			N/A	N/A	N/A	4.82		N/A
2043	Scheduled Minor	5.08	2.00		N/A	N/A	N/A	5.08	2.00	N/A
2044		5.34			N/A	N/A	N/A	5.34		N/A
2045	Scheduled Minor	5.60	2.00		N/A	N/A	N/A	5.60	2.00	N/A
2046		5.86			N/A	N/A	N/A	5.86		N/A
2047	Scheduled Minor	6.12	2.00		N/A	N/A	N/A	6.12	2.00	N/A
2048		6.38			N/A	N/A	N/A	6.38		N/A
2049	Scheduled Minor	6.65	2.00		N/A	N/A	N/A	6.65	2.00	N/A
2050	Major Rehab	6.91			N/A	N/A	N/A	6.91		N/A
2051	Scheduled Minor	7.17	2.00		N/A	N/A	N/A	7.17	2.00	N/A
2052		7.43			N/A	N/A	N/A	7.43		N/A
2053	Scheduled Minor	7.69	2.00		N/A	N/A	N/A	7.69	2.00	N/A
2054		7.95			N/A	N/A	N/A	7.95		N/A
2055	Scheduled Minor	8.21	2.00		N/A	N/A	N/A	8.21	2.00	N/A
2056		8.47			N/A	N/A	N/A	8.47		N/A
2057	Scheduled Minor	8.73	2.00		N/A	N/A	N/A	8.73	2.00	N/A
2058		8.99			N/A	N/A	N/A	8.99		N/A
2059	Scheduled Minor	9.26	2.00		N/A	N/A	N/A	9.26	2.00	N/A
2060		9.52			N/A	N/A	N/A	9.52		N/A
2061	Scheduled Minor	9.78	2.00		N/A	N/A	N/A	9.78	2.00	N/A
2062		10.04			N/A	N/A	N/A	10.04		N/A
2063	Scheduled Minor	10.30	2.00		N/A	N/A	N/A	10.30	2.00	N/A
2064		10.56			N/A	N/A	N/A	10.56		N/A
2065	Scheduled Minor	10.82	2.00	90			N/A	N/A	10.82	92.00
<b>Sum</b>		<b>458</b>	<b>64</b>	<b>270</b>					<b>458</b>	<b>334</b>

1. Unscheduled closures from US Army Corps of Engineers, Navigation Data Center, Water Resources Support Center, 7701 Telegraph Rd., Casey Bldg. Alexandria, Virginia, 22315-3868. Average closure days 4.61days/year based on average of years 1994 to 1998. Average length of closure 2.9 hours.

2. Schedule closures estimated based on Navigation notices from the Rock Island District. From Years 1995 to 1998. In 4 years of data, Peoria Lock and Dam was closed for a total 2 times for a total of 84 hours. Thus, an average scheduled closure time of 48 hours (2 Days) is assumed every other year.

LaGrange Lock and Dam W/O Project										
Year	Main Chamber Closures (Days)			Auxiliary Chamber Closures			Project Summary			
	Maint. Item	Unsch Closures	Scheduled Closures <sup>2</sup>	Maint. Item	Unsch Closures	Scheduled Closures	Main	Aux		
		Random	Cyclical Maintenance		Random Minor	Cyclical Maintenance		Un-sched	Sched	Un-sched
2000		5.47			N/A	N/A	N/A	5.47		N/A
2001	Scheduled Minor	5.82	1.50		N/A	N/A	N/A	5.82	1.50	N/A
2002		6.16			N/A	N/A	N/A	6.16		N/A
2003	Scheduled Minor	6.51	1.50		N/A	N/A	N/A	6.51	1.50	N/A
2004		6.86			N/A	N/A	N/A	6.86		N/A
2005	Scheduled Minor	7.21	1.50		N/A	N/A	N/A	7.21	1.50	N/A
2006		7.55			N/A	N/A	N/A	7.55		N/A
2007	Scheduled Minor	7.90	1.50		N/A	N/A	N/A	7.90	1.50	N/A
2008		8.25			N/A	N/A	N/A	8.25		N/A
2009	Scheduled Minor	8.59	1.50		N/A	N/A	N/A	8.59	1.50	N/A
2010		8.94			N/A	N/A	N/A	8.94		N/A
2011	Scheduled Minor	9.29	1.50		N/A	N/A	N/A	9.29	1.50	N/A
2012		9.63			N/A	N/A	N/A	9.63		N/A
2013	Scheduled Minor	9.98	1.50		N/A	N/A	N/A	9.98	1.50	N/A
2014		10.33			N/A	N/A	N/A	10.33		N/A
2015	Major Rehab	10.68		90	N/A	N/A	N/A	10.68	90.00	N/A
2016		3.74			N/A	N/A	N/A	3.74		N/A
2017	Scheduled Minor	4.08	1.50		N/A	N/A	N/A	4.08	1.50	N/A
2018		4.43			N/A	N/A	N/A	4.43		N/A
2019	Scheduled Minor	4.78	1.50		N/A	N/A	N/A	4.78	1.50	N/A
2020		5.12			N/A	N/A	N/A	5.12		N/A
2021	Scheduled Minor	5.47	1.50		N/A	N/A	N/A	5.47	1.50	N/A
2022		5.82			N/A	N/A	N/A	5.82		N/A
2023	Scheduled Minor	6.16	1.50		N/A	N/A	N/A	6.16	1.50	N/A
2024		6.51			N/A	N/A	N/A	6.51		N/A
2025	Scheduled Minor	6.86	1.50		N/A	N/A	N/A	6.86	1.50	N/A
2026		7.21			N/A	N/A	N/A	7.21		N/A
2027	Scheduled Minor	7.55	1.50		N/A	N/A	N/A	7.55	1.50	N/A
2028		7.90			N/A	N/A	N/A	7.90		N/A
2029	Scheduled Minor	8.25	1.50		N/A	N/A	N/A	8.25	1.50	N/A
2030		8.59			N/A	N/A	N/A	8.59		N/A
2031	Scheduled Minor	8.94	1.50		N/A	N/A	N/A	8.94	1.50	N/A
2032		9.29			N/A	N/A	N/A	9.29		N/A
2033	Scheduled Minor	9.63	1.50		N/A	N/A	N/A	9.63	1.50	N/A
2034		9.98			N/A	N/A	N/A	9.98		N/A
2035	Scheduled Minor	10.33	1.50		N/A	N/A	N/A	10.33	1.50	N/A
2036		10.68			N/A	N/A	N/A	10.68		N/A
2037	Scheduled Minor	11.02	1.50		N/A	N/A	N/A	11.02	1.50	N/A
2038		11.37			N/A	N/A	N/A	11.37		N/A
2039	Scheduled Minor	11.72	1.50		N/A	N/A	N/A	11.72	1.50	N/A
2040	Major Rehab	12.06		90	N/A	N/A	N/A	12.06	90.00	N/A
2041	Scheduled Minor	5.40	1.50		N/A	N/A	N/A	5.40	1.50	N/A
2042		5.75			N/A	N/A	N/A	5.75		N/A
2043	Scheduled Minor	6.09	1.50		N/A	N/A	N/A	6.09	1.50	N/A
2044		6.44			N/A	N/A	N/A	6.44		N/A
2045	Maint. Dewater	6.79	1.50		N/A	N/A	N/A	6.79	1.50	N/A
2046		7.14			N/A	N/A	N/A	7.14		N/A
2047	Scheduled Minor	7.48	1.50		N/A	N/A	N/A	7.48	1.50	N/A
2048		7.83			N/A	N/A	N/A	7.83		N/A
2049	Scheduled Minor	8.18	1.50		N/A	N/A	N/A	8.18	1.50	N/A
2050		8.52			N/A	N/A	N/A	8.52		N/A
2051	Scheduled Minor	8.87	1.50		N/A	N/A	N/A	8.87	1.50	N/A
2052		9.22			N/A	N/A	N/A	9.22		N/A
2053	Scheduled Minor	9.56	1.50		N/A	N/A	N/A	9.56	1.50	N/A
2054		9.91			N/A	N/A	N/A	9.91		N/A
2055	Scheduled Minor	10.26	1.50		N/A	N/A	N/A	10.26	1.50	N/A
2056		10.61			N/A	N/A	N/A	10.61		N/A
2057	Scheduled Minor	10.95	1.50		N/A	N/A	N/A	10.95	1.50	N/A
2058		11.30			N/A	N/A	N/A	11.30		N/A
2059	Scheduled Minor	11.65	1.50		N/A	N/A	N/A	11.65	1.50	N/A
2060		11.99			N/A	N/A	N/A	11.99		N/A
2061	Scheduled Minor	12.34	1.50		N/A	N/A	N/A	12.34	1.50	N/A
2062		12.69			N/A	N/A	N/A	12.69		N/A
2063	Scheduled Minor	13.03	1.50		N/A	N/A	N/A	13.03	1.50	N/A
2064		13.38			N/A	N/A	N/A	13.38		N/A
2065	Major Rehab	13.73		90	N/A	N/A	N/A	13.73	90.00	N/A
<b>Sum</b>		<b>566</b>	<b>47</b>	<b>270</b>				<b>566</b>	<b>317</b>	

1. Unscheduled closures from US Army Corps of Engineers, Navigation Data Center, Water Resources Support Center, 7701 Telegraph Rd., Casey Bldg. Alexandria, Virginia, 22315-3868. Average closure days 5.47 based on average of years 1994 to 1998. Average length of closure 3.3 hours.

2. Schedule closures estimated based on Navigation notices from the Rock Island District. From Years 1995 to 1998. In 4 years of data, LaGrange was closed for a total 2 times for a total of 72 hours. Thus, an average scheduled closure time of 36 hours (1.5 Days) is assumed every other year.