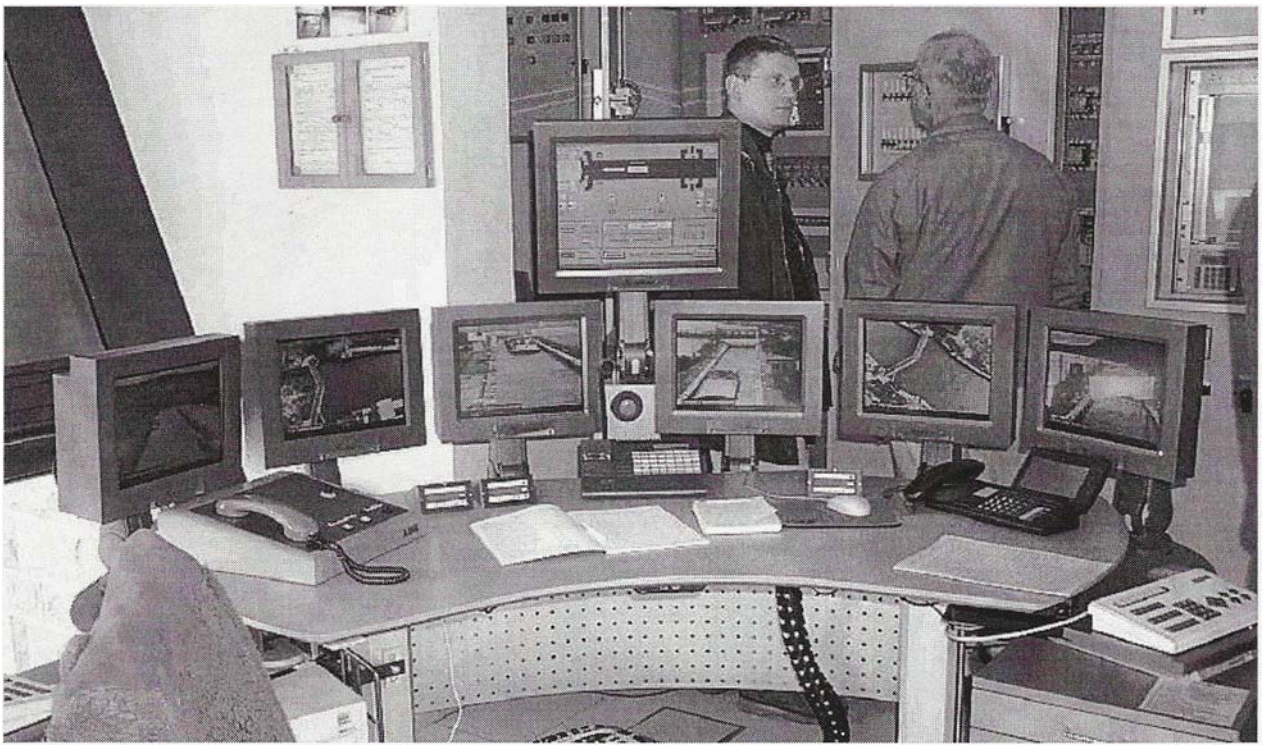
Upper Monongahela River Automation Study



Pittsburgh District
Corps of Engineers
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1. Introduction

The purpose of this study phase is to determine the practicality of automation of the Morgantown, Hildebrand, and Opekiska Locks and Dams. . The Morgantown, Hildebrand, and Opiskiska facilities are located on the upper Monongahela River in the State of West Virginia. All three facilities are maintained by the U.S. *Army* corps of Engineers, Pittsburgh District. Recent cutbacks in operating hours have caused local concerns. Automation would allow for expanded operations under present fiscal constraints via remote operations from another site.

2. Study Authority

The *2004* Energy and Water Development Appropriations Act provided $342,000 for the Corps of Engineers to examine the practicality of remote control automation devices at the Hildebrand, Morgantown, and Opekiska Locks and to report to the Committees on Appropriations of its findings by March 31, *2004."* CR 59.

This report will serve as an interim document in response to the Appropriations Act reporting requirement. Approval and funding for this investigation was received in late January resulting in a two phase approach to study development. This interim report will first address and report on the merits of automation of the upper Monongahela facilities, the Morgantown, Hildebrand, and Opekiska Locks and Dams, operated by the Corps of Engineers, Pittsburgh District. This will then be followed up with a more detailed analysis of the full practicality of automation. Efforts for this study have concentrated at this time on the capacity to successfully engineer conceptual plans/alternatives for the automation of the Morgantown, Hildebrand, and Opekiska Locks and Dams and the future requirements to implement those plans and alternatives.

3. Purpose

The Monongahela River has served as the focal point for the economic and industrial development of the Monongahela River Valley and its tributaries. In recent years, the entire Monongahela Valley, from Pittsburgh, Pa to Fairmont, WV, has seen a considerable decrease in industrial output. As a result of this industrial decrease, commercial traffic utilizing the river facilities has also decreased. Since the primary purpose of the Morgantown, Hildebrand, and

Opekiska Locks and Dams, like other elements of the overall river navigation system, is to facilitate the movement of commercial traffic, the decline in such traffic is making it more difficult to justify their continued operation and maintenance. This has resulted in a reduced operating schedule. In recent years, however, West Virginia has witnessed tremendous growth in both the recreation and tourism industries. This is especially true for the upper Monongahela River area, where the resurgence of waterfront areas in many urban areas has and continues to serve as motivation for economic development. Waterfront development was deemed to be important as an impetus to economic growth and the creation of jobs. This has lead to a substantial increase in recreational boaters. So while the need for river faculties, other than for industrial use, is increasing the ability of the Corps of Engineers to staff facilities is decreasing. This has resulted in a clash between the recreational boaters' needs and the ability to provide services. Facility automation is seen as a potential solution to this situation.

4. Study Area

General Location

The general area of consideration for this investigation is the upper Monongahela River which is generally the Monongahela River within the State of West Virginia. The 128-mile Monongahela River starts at Fairmont, in the mountains of West Virginia and ends at Pittsburgh where it meets the Allegheny River to form the Ohio River. Generally flowing northward, the Monongahela River is formed by the Tygart Valley River and the West Fork River in Fairmont, West Virginia. In the State of West Virginia, the Monongahela River traverses Marion and Monongalia Counties and flows for approximately 37 miles to the Pennsylvania- West Virginia border. The river is used for freight, recreational boating, fishing, drinking and industrial water supplies, and waste water discharge. Three navigation lock and dam structures, which are operated by the Corps of Engineers, Pittsburgh District, exist within the upper Monongahela River area. The three navigation structures include the Morgantown Lock and Dam at river mile 102.0, Hildebrand Lock and Dam at mile 108.0 and Opekiska Lock and Dam at mile 115.4.

Socio Economic Profile

The primary area of consideration is the Monongahela River within Marion and Monongalia Counties West Virginia. Marion County was first settled in 1772 along Booth's Creek by James Booth and John Thomas. In 1774 Fort Prickett was built at the mouth ofPricketts Creek and a settlement was started in 1818, at what is now the City ofFairmont. Fairmont was legally established in 1820 as Middletown but the name was changed to Fairmont in 1843. Marion County was officially created in 1842 and presently encompasses 312 square miles. Monongalia County was formed in 1776 from the territory of West Augusta. From this original county, over twenty counties in West Virginia and Pennsylvania had been formed. The area was first settled by Zaquill Morgan and others in 1766. In 1782 Morgan's home became the seat of justice and in 1785 Morgantown was officially established. Monongalia County covers an area of 363 square miles.

Population in both counties reached a peak in the 1950's. Since that time, loss of industrial output in the region has translated into loss of jobs and economic decline. The entire Monongahela was a hard-working river; the busiest inland waterway in the world when Pittsburgh was the capital of industry. The Monongahela River Valley, commonly known as the "Steel Valley" now suffers economic depression but it also offers great new advantages for water recreation, waterfront development, and tourism industry. The loss of jobs is being offset by a push by to develop a more recreation based economy. West Virginia as well as Marion and Monongalia Counties have made increased tourism a vital concern. Much of this recreational growth is along the Monongahela River.

Marion County, WV Population by Decades

Date	Population	Population Change	Annual % Change
1900	32,430	-	-
1910	42,794	10,364	2.8
1920	54,571	11,777	2.5
1930	66,655	12,084	2.0
1940	68,683	2,028	0.3
1950	71,521	2,838	0.4
1960	63,717	-7,804	-1.1
1970	61,356	-2,361	-0.4
1980	65,789	4,433	0.7
1990	57,249	-8,540	-1.4
2000	56,598	-651	-0.1

U.S. Bureau of Census

Monongalia County, WV
Population by Decades

Date	Population	Population Change	Annual % Change
1900	19,049	-	-
1910	24,334	5,285	2.5
1920	33,618	9,284	3.3
1930	50,083	16,465	4.1
1940	51,252	1,169	0.2
1950	60,797	9,545	1.7
1960	55,617	-5,180	-0.9
1970	63,714	8,097	1.4
1980	75,024	11,310	1.6
1990	75,509	485	0.1
2000	81,866	6,357	0..8

U.S Bureau of Census

Past use along the Monongahela River primarily centered on industry. Today, however, industrial use has declined and the area has witnessed the growth of both recreational and tourism again centered on the river. Recreational boating has also increased with the new lifestyle. Its popularity is increasing as evidenced by a steady increase in recreational lockages over the past twelve years. During that period, recreational lockages increased over 57 percent at Morgantown, 79 percent at Hildebrand, and 16 percent at Opekiska. In contrast, commercial tonnage and lockages have decreased. During the same twelve year period, commercial tonnage decreased over 67 percent at Morgantown, 44 percent at Hildebrand, and 35 percent at Opekiska. Likewise, commercial lockages decreased over 52 percent at Morgantown, 7.5 percent at Hildebrand, and 9.6 percent at Opekiska. The following table indicates the increase in boat registrations, over the past decade, in the State of West Virginia.

West Virginia Boating Registration

	1999	**2000**
Powered boats	47,451	60,895
Non-Powered boats	0	0
Other	7,026	0
Total	54,477	60,895

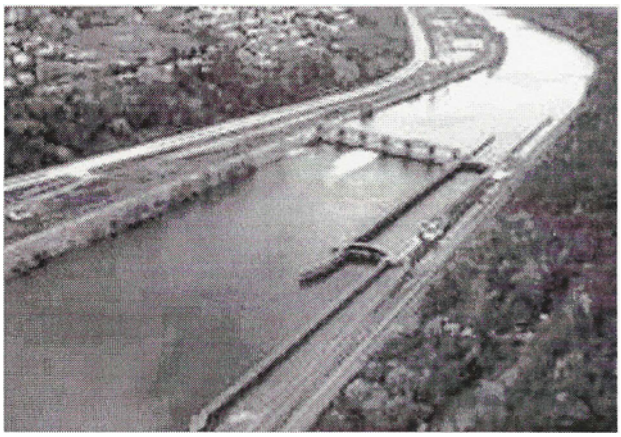
U.S. Department of Transportation, U.S. Coast Guard, *Boating Statistics, 2000* and *Boating Statistics,* 1999, Washington, DC: 2001

These new opportunities are often in conflict with existing requirements. Due to loss of commercial traffic, operating hours at the three locks and dams in the study area are being curtailed. Recreational needs, however, are increasing. While the importance of continued operation of the locks for recreational boating is recognized locally, it is not an official project purpose, and therefore, is not a basis for funding decisions. More and more recreational boaters, however, are requesting use of the facilities. A requirement of maximum operating hours with minimal staffing for the Morgantown, Opekiska, and Hildebrand Lock and Dam facilities would satisfy the reality of the new economy along the Upper Monongahela River.

Morgantown Lock and Dam

Morgantown Lock and Dam is located at river mile 102.0 at the City ofMorgantown, West Virginia. Morgantown Lock and Dam consists of a single 84 X 600 lock chamber and a 366 foot long gated dam. The dam forms a pool approximately 6 miles long. The lock chamber and operations building are situated along the left bank of the river. Annual traffic includes approximately 830,000 tons of freight (based upon fiscal year 2001 data).

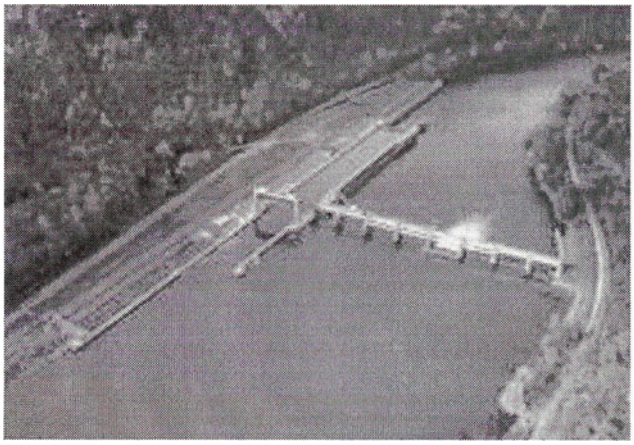
Construction ofMorgantown Lock and Dam began in 1948 and was completed in 1950. The structure brought about the removal of the original stone and timber Locks 10 and 11 which had been built by the government in the period 1897 and 1903.



Operating expenses for Morgantown Locks and Dam have been reduced in recent years. Last years (fiscal year 03) operations and maintenance budget for the Morgantown Locks and Dam facility was $751,072.33 down from FY02 budget of$804,456.73. This reduction resulted primarily from reductions in staffing. The FY04 budget is anticipated to reflect the FY03 budget.

Hildebrand LID

Hildebrand Lock and Dam is located at river mile 108.0, six miles southwest of the City of Morgantown, West Virginia and near Hildebrand, West Virginia. The navigation facility was opened in March 1960. Hildebrand Lock and Dam consists of a single 84 X 600 foot lock chamber and a 366 foot long gated dam. Annual traffic includes approximately 293,000 tons of freight (based upon fiscal year 2001 data).

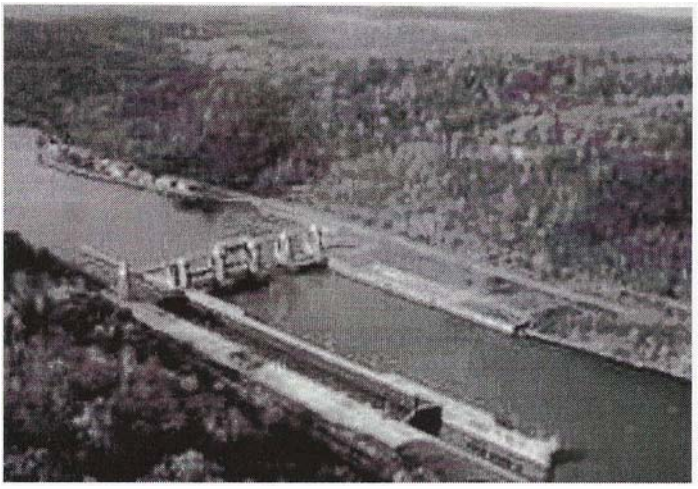


Hildebrand Lock and Dam was constructed in the period from 1950 to 1960 and eliminated the older Locks 12 and 13 which had been in service since 1903.

Operating expenses for Hildebrand Locks and Dam have been reduced in recent years. Last years (fiscal year 03) operations and maintenance budget for the Hildebrand Locks and Dam facility was $175,287.22 down from FY02 budget of $214,721.90. This reduction resulted primarily from reductions in staffing. The FY04 budget is anticipated to reflect the FY03 budget.

Opekiska Lock and Dam

Opekiska Lock and Dam is located at river mile 115.4, about 7 miles northeast of the city of Fairmont, West Virginia. Opekiska Lock and Dam consists ofa 84 X 600 lock chamber and a 366 foot long gated dam. Annual traffic includes approximately 290,000 tons of freight (based upon fiscal year 2001 data). The facility forms a pool of 13.33 miles of the Mon River plus a few miles of narrow channel on the Tygart and West Fork rivers.



Completing the modernization ofthe West Virginia portion of the Monongahela River was realized with the construction of the Opekiska Lock and Dam project in the years 1961 to 1964. Locks 14 and 15, the last of the 60-year-old locks and dams, were removed.

Operating expenses for Opekiska Locks and Dam have been reduced in recent years. Last years (fiscal year 03) operations and maintenance budget for the Opekiska Locks and Dam facility was $209,781.59 down from FY02 budget of$215,105.26. This reduction resulted primarily from reductions in staffing. The FY04 budget is anticipated to reflect the FY03 budget

Existing Condition

Commercial lockages at the Morgantown, Hildebrand, and Opekiska Lock and Dam facilities have generally declined in recent years. This has prompted the Pittsburgh District Corps of Engineers to adjust operating schedules to reflect the commercial requirements. A steady decline in personnel staffing and operating budget has occurred in past years.

A look at commercial lockages in recent fiscal years is as follows:

Commercial Lockages per Fiscal Year

	FYO3	FYO2	FYOI	FYOO	FY99
Morgantown	287	423	401	302	191
Hildebrand	60	175	91	54	43
Opekiska	60	175	89	48	43

As a result of declining commercial lockages the staffing and hours of operation have also been reduced. A brief look a staffing in recent years indicates sizable reductions from a total of 18 personnel, for the three facilities, in 1992 to a total of 8 personnel at the three projects today. At the present time both Hildebrand and Opekiska have a staff of one. This often requires shifting of personnel between the facilities in order to maintain scheduled operations. In the absence of

that single individual at either Hildebrand or Opekiska, a substitute must be temporally reassigned from the Morgantown facility to maintain operations. This is a cause of inefficiency and strained resources. This also leads to a likely scenario that the next reduction could lead to facility closure with no staffing. Current and past staffing levels are:

Facility Staffing Levels

	1992-1993	1994-1998	1999-2000	2001-2002	2003-2004
Morgantown	8	9	9	9	6
Hildebrand	5	4	3	2	1
Opekiska	5	4	3	2	1

The present operating schedule is extremely limited for the Morgantown, Hildebrand and Opekiska facilities. This is especially true for Hildebrand and Opekiska. These facilities are operated only seasonally on a limited time daily during the season. This limitation on operating hours is the basis of the difficulty with the relational boaters. Much of the time recreational boaters are utilizing the Upper Monongahela waterway the Lock and Dam facilities are not in operation. This limits the recreational boater to the length of the river between the two nonoperating lock and dam facilities. This can be as little as 6 miles, greatly curtailing the pleasure of the recreational boater. To this end, a solution which accounts for limited personnel and funding for the Morgantown, Hildebrand and Opekiska facilities while maximizing the operations capabilities is vital to the wellbeing and future economic success of the region. Present lock schedules are:

2004 Lock Schedules

	mid May - mid Oct	late Oct - mid May
Morgantown	24 hr/day - 7 days/wk	7 days/wk - 8 hr/day **0800-1600**
Hildebrand	Sat, Sun & Holiday 1230-2020	Closed to navigation
Opekiska	**Sat, Sun & Holiday 1230-2020**	**Closed to navigation**

5. Prior Projects and Studies

A large and diverse array of studies, dealing with many aspects of the Monongahela River and its tributaries in West Virginia, has been conducted in past years by the Pittsburgh District. These studies range in scope from comprehensive plans and economic base studies to site specific evaluations and detailed monographs pertaining to biological phenomena. Prior studies conducted by the Corps of Engineers, which should be noted include a basin flood study, a comprehensive study, and site specific site plan development.

The Monongahela River Basin flood investigation was undertaken to identify major damage centers within the entire Monongahela River Basin and to investigate potential solutions to the problems such as local protection projects and/or reservoir plans. Completed in August 1990, the study recommended a flood control study along the Cheat River Basin Study and several individual studies for local protection projects. In addition to the 1990 Basin study a

Reconnaissance Study of the Basin was completed in 1996 and several local flood protection projects were found to be feasible.

The Monongahela River Comprehensive Study, completed in 1995 focused on three interrelated study components through an extensive public involvement process. One component pf the Comprehensive Study was the identification and completion of conceptual plans of waterfront development for eight identified sites. During the course of the public involvement process for this study, numerous concerns were voiced related to lock and dam operations.

The Monongahela River PED Investigation, completed in 1999, provided detailed plans and specifications for several of the waterfront sites identified in the 1995 Comprehensive report. Two sites developed were the Morgantown Riverfront Park and the Caperton Riverfront Trail. Documents were provided to the local sponsors who utilized the information as a basis for their moving ahead with the implementation of the projects.

Two reservoir projects are located near and influence the study area. The Tygart River Lake project is located on the Tygart and the Stonewall Jackson Lake is located on the West Fork River. The Tygart River and the West fork River join at Fairmont to for the Monongahela River. These two projects provide flood damage reduction along the entire Monongahela River.

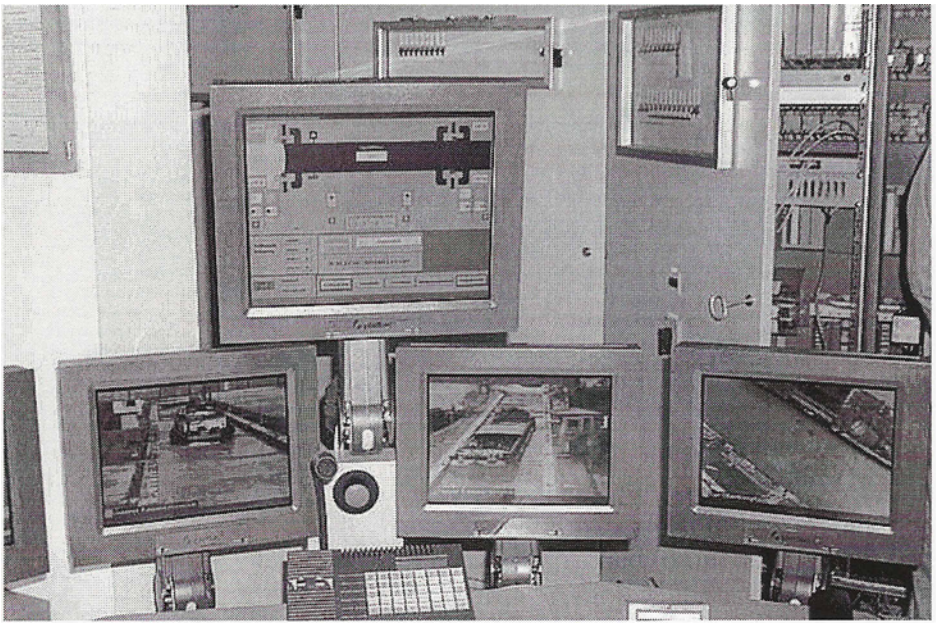
6. Plan Formulation

Background

The purpose of this study is to develop and evaluate a plan for the automation through remote operation of the three locks on the Upper Monongahela River, Morgantown, Hildebrand, and Opekiska. Automation and remote control of Morgantown, Hildebrand, and Opekiska Locks and Dams from the next downstream facility, Point Marion Lock and Dam, could reduce future operation and maintenance costs, while increasing system access. This would permit these locks which are now operating on reduced daily or even seasonal schedules to be available for lockages at all times. The ability to operate more efficiently at lower funding levels would offer a higher degree of assurance that the system will continue to operate in the future. For businesses considering investing in the area, from marinas to restaurants to coal mines, this is an important consideration. For the local communities attempting to grow, or in some cases just survive, a reliable navigation system is critical.

The technology and procedures required for the automation and remote control of navigation and flood control dams is are already in use at numerous locations, including several Corps projects. The dam gates at Hildebrand and Opekiska have been successfully operated from Morgantown since 1983, making them among the first projects to be operated by remote control. This system has since been upgraded to operate all three dams from the Point Marion location. Several other Corps Districts are studying the advantages of remote operations. Lastly, the first phase for the automation and remote control of both locks and dams has been successfully implemented on two major waterways in Germany. The first phase for one of these navigation systems consists

of seven locks and dams operated from one new remotely located work center. When the remaining two phases are completed, twenty-one locks and dams will be operated from three remote work centers. Each ofthese centers will have three work stations for a total of nine. The number of work centers and work stations needed to operate the system at any given time will vary with traffic requirements. One of the remote stations is shown below:



Reliability and safety are primary concerns with any major change in operating systems and procedures. These concerns can be addressed and even enhanced with carefully selected camera views of the locks and approaches, redundant communication and control systems, and modern low-maintenance operating machinery. Security concerns can be addressed with security systems, cameras and coordinated response plans with the local authorities. An example of camera stationing is shown below:

Methodology

The following is a general overview of the upgrades and modifications that will be required at each lock for implementing automation and remote control of the Upper Monongahela River System. The following is a description of the major features of work required for each lock.

Mechanical Systems

The miter gate and valve machinery at each lock is original, dating back as far as 1950. The miter gate and valve machinery is operated manually via control levers mounted on the lock wall adjacent to each set of miter gates and valves. Each existing machine consists of large cast gears and strut type linkage operated by a hydraulic cylinder and will require extensive modification or replacement to be compatible with automation or remote control. Modem machinery that is compatible was recently installed at Locks 4 and 5 on the Allegheny River as part of a major maintenance effort. The new machinery consists of self-contained hydraulic actuators that are directly connected to the miter gates and valves. These actuators are controlled by variable frequency drives (VFD) that are compatible with the sensors and programmable logic controllers (PLC) required for remote operation. Some modifications to the existing machinery recesses will be required to accommodate the new miter gate and valve machinery.

The hydraulic system at each lock also is original, consisting of three main system pumps and a holding pump. These are connected to each miter gate and valve cylinder by an extensive piping system. These centralized hydraulic systems are not reliable enough to justify the modifications required to make them compatible with automation and remote control. Since the new selfcontained miter gate and valve machinery does not require centralized hydraulics, the existing system at each lock would be completely removed. The exiting compressed air system at each lock will need to be modified by installing solenoid operated control valves in the air bubbler system for compatibility with remote PLC operation. The existing generator at each lock will have to be replaced with a larger unit, sized to operate the new miter gate and valve machinery. An automatic transfer switch will also be required for system automation.

Automation and Remote Control Systems

An assessment of the existing electrical system was made at Morgantown, Opekiska, and Hildebrand LID. To fully automate and remotely control the locks, a complete electrical rehabilitation at each facility is necessary. Many ofthe existing electrical components at each facility were installed as part of the original construction contracts. Various components have been replaced or repaired over the years, but the original hardwired control system is essentially in place. Replacement or repair of existing components has become difficult. The existing equipment does not lend itself to automation of the project. Therefore, new modern control systems shall be installed to monitor and remotely control each facility. At the present time, the dam gates at each facility are remotely controlled via the Pittsburgh District network from Point Marion LID. A basic, closed circuit television (CCTV) system at each facility assists the operators in the remote control of the dam gates. In a similar configuration, all aspects of the locks could be remotely monitored and controlled from Point Marion LID Remote control of the locks shall be identical to hardwired, on-site controls, and shall provide the same functionality to an operator. All system interlocks and safety permissives shall be maintained for safe, remote operation of each facility. By providing the same functionality and operating scenarios from a remote location, the locks can remain open, virtually 24 hours a day, 7 days a week.

The existing electrical system will have to be replaced for efficient and effective automation and remote control of each lock. At each facility, all operating machinery and monitoring equipment shall be interfaced to programmable logic controllers (PLCs). This includes, operating machinery, hydraulic systems, traffic control systems, electrical distribution systems, and any component normally associated with the operation of a lock. Multiple PLCs shall be incorporated to monitor various functions of the facility and to provide backup capabilities in the event of a failure. The PLCs shall communicate over an industrial, fault tolerant, communication network to a central on-site network of computers. With modern control systems, there are endless possibilities for remote control, system maintenance, monitoring, and troubleshooting. PLC based control systems are installed in many applications today and the reliability of this equipment is well documented in various industries. In the Pittsburgh District alone, various systems have been in operation for years with essentially no down time attributed to the components of the PLC system. Throughout the Corps of Engineers, most projects are currently being designed or retrofitted with PLC based control systems with remote and automated control in mind. To minimize the problems associated with any remote control system, redundant

control systems shall be incorporated. If necessary, the project could still be operated using hardwired, manual controls by an operator on-site.

In addition to remote control, the PLC can provide condition monitoring of all equipment. By monitoring and trending equipment parameters, preventive maintenance can be performed before a system failure occurs. Not only can the control system reduce downtime, but it can reduce the time and effort required to troubleshoot the system. By reporting a failure or potential failure, maintenance crews can solve a problem in less time and keep the system operating with little to no intervention, avoiding untimely breakdowns and unscheduled overtime.

The remote control station, located at Point Marion LID, rivermile 90.8, shall be located in a single control room for central monitoring of each facility. The operator shall perform lock operations using a graphical user interface (QUI) running on an industrial personal computer (IPC). The QUI shall provide the operator with the status and information about each lock control system. For example, the operator shall be capable of monitoring the backup generator, determining water levels within the lock chambers, and determining the position of each miter gate or valve. The IPC at Point Marion shall communicate on a secure, virtual private network (VPN) between each site. A VPN between each site insures a secure connection accessible only to qualified USACE personnel. Communications between each site is a vital link and upgrades to existing infrastructure between each site may be required by the local telecommunications providers to insure a reliable and stable system.

The communication system at each facility is another important aspect for automating and remotely controlling each facility. The remote operation of each facility shall rely on a closed circuit television (CCTV) system to act as the eyes for the remote operator. The CCTV system shall consist of multiple cameras, strategically placed to permit unobstructed views of all operating equipment. In addition, the CCTV system shall provide remote surveillance of the entire facility to insure security is maintained at each site. The CCTV system shall be interfaced with an intrusion detection system (ISD) that is capable of alerting USACE and local law enforcement officials of a breach in security. Additional security upgrades to the infrastructure are required to prevent or delay intruder access to the facility. At the remote operating station, the operator shall have the capability of controlling each camera individually, if desired. With full control of each camera, remote personnel shall have the capability of monitoring any area full or part time. Multiple video monitors shall be provided for display of the various camera views. The CCTV system shall be automated and coordinated with the lock control system. This means, based on system operating sequences and events, the operator shall be provided with the correct, preset views for a safe and timely lockage at each facility. Video surveillance and central monitoring is currently in operation at Point Marion LID for remote dam gate control. The current video arrangements provide the operator with upstream and downstream dam views. The operator analyzes the video for obstructions and/or hazards before operating a dam gate. For a remote lockage, the operator shall be required to visually inspect all areas of the lock before proceeding with a remote lockage. Therefore, it is essential to have a state-of-the-art video distribution and control system. However, the CCTV system is only one type of communication system required for the remote control of each facility. Additional upgrades are required for two-way communication with commercial and recreational vessels. Remote operators shall have the capability of conversing with vessel operators in the same manner as if they were on-site.

Speakers, microphones, intercoms, and telephones shall be provided for this purpose. Fast and reliable data transmission for remote control is perhaps the most important aspect of any communication system. To insure real-time data transfer, the most reliable and up-to-date offthe-shelf equipment shall be incorporated.

Safety Considerations

Safety at all Corps of Engineers facilities is always a concern. As with any lock operation, remote operations will be conducted with safety as the prime consideration. Cameras will afford a total view of all operations. In fact, multiple cameras and camera angles should provide the operator a more detailed perspective of the operation than is presently afforded. During certain emergencies like a deckhand or recreation boater falling from a vessel into the lock chamber an on-site Lock Operator can offer immediate assistance and have been credited with saving of lives. However, remote operations provide a total look at the operation from multiple points. This affords the operator an improved capability to circumvent problems should any arise. Although off site operation has disadvantages due to locality issues, safety is not among these drawbacks. Remote operations can be accomplished in a safe operating manner.

Additional Efforts

This overview reflects the design and installation of the automation features required to operate Morgantown, Hildebrand, and Opekiska Locks and Dams from Point Marion Lock and Dam. Upon completion of the design, the work would proceed in three phases over a three to four year period. The first phase would consist of installing the remote control room at Point Marion, procuring the new operating machinery and controls for all three locks, and installing the new equipment at Morgantown. Remote operation of Morgantown would begin when phase one is completed. The second phase would include the installation of the equipment for remote operation of Hildebrand and the third phase would complete the installation at Opekiska.

The design could begin next fiscal year, provided authorization and appropriations have been received. The design effort would take 8 to 9 months and would include an investigation of environmental impacts. The construction contract for phase one would take 1 to 2 years to complete. The construction contracts for phases two and three would each take 1 year to complete.

7. Environmental Impacts

Natural Resources

An Environmental Assessment must be required to identify and evaluate potential environment impacts associated with automation of the Morgantown, Hildebrand, and' Opekiska Lock and Dam facilities. Implantation of automation facilities may require construction and will require

rehabilitation of the facilities. Construction impacts as well as operational changes are activities which will require compliance with the National Environmental Policy Act, Endangered Species
Act, Fish and Wildlife Coordination Act, and Clean Water Act. Issues of concern affecting these acts include public controversy, historic resources, increased fish passage, increased noise, and potential conflicts between recreational and commercial traffic. An analysis of the requirements as well as costs will be addressed with further investigations.

Cultural Resources

A Phase I cultural resource assessment may be required to evaluate potential impacts on historic and archaeological resources associated with the construction for automation of the Morgantown, Hildebrand, and Opekiska Lock and Dam facilities. The automation which will require changes to structure, equipment, and operation is an undertaking subject to compliance under Section 106 ofthe National Historic Preservation Act. Although at this time only the Morgantown facility is eligible, plans, drawings and other historic data may be of concern for all three facilities. An analysis of the requirements as well as costs will be addressed with further investigations.

Hazardous, Toxic, and Radiological Waste (HTRW)

A Phase I Environmental Site Assessment for Hazardous, Toxic, and Radiological Waste (HTR W), may be required during further study. The HTR W investigation must be performed to evaluate potential environmental liabilities in the project area which may affect the feasibility of development. Initial efforts would consist of a site reconnaissance, information and record review, interviews and a deed search. Findings will indicate the need to continue into testing.

8. Real Estate

It appears that most if not all of the proposed work will occur within the boundaries of land already owned by the Corps of Engineers. However, it is possible that real estate interests might be needed to support laydown areas or site access and/or licenses might be necessary to support communication or related lines.

Initial real estate efforts will include early review of plans and drawings outlining the scope and work limits for this project in an effort to confirm and certify that the necessary real estate interests are available. If any acquisition is needed, the construction schedule will be modified at that time as necessary. An analysis of real estate requirements, as well as, costs will be addressed with further investigation.

9. Economics

No Action Plan

Under the without-project condition, the existing situation would remain for the Upper Monongahela River and associated Lock and dam facilities. Financial considerations will continue to lessen the use of the availability of the Morgantown, Hildebrand and Opekiska facilities. The without-project condition will continue to negatively impact on recreational boating which will negatively influence growth and development ofthe tourism industry. This would continue the downward economic condition experienced by this area for the last century. Therefore the No Action Plan was considered unacceptable for this investigation.

Life Cycle Costs

A comparison of project costs for the present condition and the automation alternative must be conducted as part of the final documentation effort. Specifically, interest during construction and annual operation and maintenance costs for each situation must be calculated and computed. The costs will then be calculated through a comparison of life-cycle costs. Benefits of the automation alternative can be computed as the possible reduction in operating (labor) costs and the increase in recreation benefits due to longer operating hours.

10. Federal Interest

Automation improvements are practical within engineering terms and readily acceptable. No authorization or appropriations exist to continue beyond this investigation. This investigation will be completed this fiscal year and will include more detailed planning and engineering aspects. Beyond completion of this investigation no further effort is anticipated unless additional authority and appropriations are received to continue with the effort.

11. Further Activities and Funding

This initial aspect of this investigation was completed at 100% Federal expense utilizing a small portion of the funds allocated for Fiscal Year 04. Additional investigative efforts to further review and develop planning and engineering this fiscal year, including cursory investigations related to necessary engineering and design, cost engineering, economic, environmental, cultural resource, HTR W and real estate concerns will be conducted and reported upon with remaining FY04 funding. Upon completion of FY04 investigative efforts remaining requirements include preparation of plans and specifications, completion of an environmental assessment, and completion of construction cost estimates. Costs to complete this effort are presently estimated at $700,000 and could be completed in the first fiscal year in which funding is received. This would be followed by construction with costs of an estimated $4,500,000 the next fiscal year and $3,500,000 for each of the following fiscal years. A cost summary, assuming required appropriations is as follows:

Activity	Fiscal year	$
Complete initial study	FY04	
Plans and Specs & Preconstruction effort	FY05	$ 700,000
1 st Construction contract	FY06	$4,500,000
2nd Construction contract	FY07	$3,500,000
3rd Construction contract	FY08	$3,500,000

12. Conclusions and Recommendations

A tremendous need and opportunity exists to automate the Upper Monongahela River facilities, specifically the Morgantown, Hildebrand and Opekiska Locks and Dams. A need exists for increased operating time for recreational boaters. Remote operations are practical and operable. The process of automation could provide increased service during a period of decreasing operating funds.

It is recommended that this investigation be completed with remaining FY04 funding. Although warranted, no further efforts are recommended at this time since no authority permits.

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