6.0 SUMMARY AND CONCLUSIONS

6.1 Summary of Investigations and Results

The Mahoning River Environmental Dredging Reconnaissance Study was undertaken to demonstrate the cost effectiveness of removing and/or remediating contaminated sediments from various sections of the Lower Mahoning River in Ohio. The major tasks included: determining the appropriate reaches of the Mahoning River in Ohio to designate for dredging or remediation; documenting the effects of contaminated sediments on the ecosystem; estimating both the degree of contamination within the clean-up area and the volume of contaminated material to be removed or remediated; determining potential dredged material treatment requirements; identifying a feasible method for disposing or otherwise using the dredged material, and; evaluating the remediation in place (stabilization) of contaminated sediments along the shore as an alternative to dredging. Early input from resource agencies interested in the area emphasized the potential benefits of removing or breaching some or all of the nine low-head dams within the project area. Therefore, the potential costs (exclusive of costs to existing users) and benefits of removing or breaching several or all of these dams was also investigated and is documented in this report.

Sampling and analysis of contaminated sediments were considered crucial to addressing the four issues with potential dramatic impacts on remediation costs; waste characterization to determine if any material is hazardous; vertical profiling to investigate whether or if contamination varies with depth, standard elution to determine potential for resuspension of contaminants during dredging, and bank sampling to better determine the lateral extent of contamination. The volume of sediments along the shore that have been covered over time by erosion of cleaner sediments from upland areas was estimated using data from the 1976 Corps of Engineers Report that considered the entire area investigated herein for remediation.

This study found that, in spite of dramatic water quality improvements brought about primarily by closure of a major portion of the industry along the Mahoning River and modernization of waste water treatment facilities, the ecosystem of the lower 43 river miles of the Mahoning River in Ohio will not recover without removal of the contaminated sediments. The following "preferred" remedial alternative is based on findings that Mahoning River sediments are severely contaminated (Section 2); that the contaminated sediments are responsible for inhibiting natural ecosystem restoration processes and, therefore, need to be removed (Section 3 and Appendix E); that removal of those sediments is technically feasible and cost effective (Section 4); and that any dams proposed for removal are not currently in use. This preferred remedial alternative is consistent with the planning objectives.

The preferred remedial alternative includes the following:

1) Seventy percent of the contaminated sediments would be dredged from the river using hydraulic dredging, and the remaining 30 percent would be dredged using mechanical dredging.

2) The dredged sediment would be placed in holding basins underlain by gravel-lined drains. Water would drain out the bottom of these basins, and be pumped from the top of the basins after the solids have settled out. Due to high level of petroleum contamination of the Mahoning River sediment, discharge to surface water would most likely require that carbon columns be added to an oil-water separator. This arrangement would be expected to provide adequate dewatering of the sediments. Water from the holding basins would be routed through an oil-water separator, likely including carbon columns (cost to be determined in the feasibility phase), and would then be returned to the Mahoning River.

3) The de-watered sediments would be disposed of at an approved municipal solid waste landfill. Alternatives to upland disposal, including beneficial reuse, would be investigated in the feasibility phase.

4) Five dams would be removed. Modification of other dams to enhance fish migration, including fish ladders, would be investigated in the feasibility phase.

5) Contaminated bank material would be excavated. The excavated bank material would be handled and disposed of in the same manner as the dredged sediments. Same alternatives as cited in 4) would be investigated during the feasibility study.

This alternative is judged to be the most cost effective remediation alternative at this time, and is expected to produce ecosystem restoration consistent with warm water habitat use of the Mahoning River within the project area. Feasibility study, estimated to cost $3.0 million, would confirm all technical assumptions, work requirements, and associated costs.

6.2 Evidence Supporting Federal Interest

The principal problem impeding restoration of aquatic habitat in the Mahoning River is the contaminated sediment in the lower mainstem of the river. Remediation of these sediments by dredging is necessary for restoration of the aquatic ecosystem, and is within the Federal interest and appropriate for USACE involvement. Additional benefits can be realized through removal or breaching of some or all of the nine low-head dams existing within the clean-up area. Modification of the dams, including the installation of fish ladders to promote fish migration would also enhance restoration and be investigated in feasibility study. Stabilizing contaminated material along the shore is deemed to be unreliable with current information and, although a less expensive alternative to dredging, not be in the Federal Interest. This option would be investigated further in the feasibility study.

Accordingly, the proposed restoration efforts identified during the Mahoning River Environmental Dredging Reconnaissance Study are consistent with Federal law, regulation and policy. Preliminary indications are that no permanent adverse environmental impacts should be anticipated from any of the proposed actions. The preliminary analysis conducted during the reconnaissance phase indicates that restoration measures are technologically feasible, and that they can be accomplished in an efficient and cost-effective and efficient manner. Further,

removal of contaminated material is expected to address local concerns by eliminating the swimming, wading, and sediment contact portions of the human health advisory. Some fish consumption limitations would persist, especially for larger and older fish species with abundant fatty tissues (such as channel catfish and carp) that tend to accumulate PCBs and other organic chemicals. However, such limits would diminish after impacted generations of fish die off and for other fish species that are less susceptible to accumulation of such harmful chemicals.

6.3 Public Views and Comments

The primary source of public views and comment on the remediation project was the Mahoning River Steering Committee established in conjunction with the study efforts. A complete listing of Steering Committee members is given in Appendix B. The Steering Committee met with Corps personnel to discuss the study on November 12, 1997, and January 28, April 16, and August 21, 1998. Summaries of each of these meetings is provided in Appendix O.

6.3.1 Evidence of Public Support

Public support for the proposed remediation of the lower Mahoning River was reflected by the enthusiasm for a remediation project shown by the Steering Committee. Also, as cited in Chapter 1, support for a remediation project was demonstrated prior to this study by numerous public officials who supported "The Mahoning River Corridor Plan". It is also noteworthy that during field efforts for this study, unsolicited but valuable public support was provided in the form of verbal statements. On many occasions, local citizens approached work crews to express support for restoration activities, provide observations about water conditions or wildlife, or provide anecdotes about historical conditions of the river. In general, there seems to be great interest in using the river if it can be restored. Further public support for a project was shown by the numerous individuals who provided time and the temporary use of property and equipment to field crews needed to put the drilling rig into the river at locations where no safe access

existed. Individuals and organizations that contributed time and/or resources to facilitate access to the river are shown on Table 14.

6.3.2 Agency Participation

As members of the Mahoning River Steering Committee, the following governmental and regulatory agencies supported the project by providing background information, technical comments, and/or assistance in recruiting a non-Federal sponsor:

- Ohio EPA
- Ohio Department of Health
- Ohio Historical Society
- Congressman Traficant's Office
- Ohio Office of the Governor
- Ohio Department of Natural Resources
- U.S. EPA
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- Pennsylvania Department of Environmental Protection
- Mahoning County Soil and Water Conservation District
- Trumbull County Soil and Water Conservation District
- Eastgate Development and Transportation Agency (EDATA)
- Mahoning County Planning Commission
- Trumbull County Planning Commission
- Youngstown Planning Commission
- City of Warren Planning Commission

Some agencies contributed analyses and interpretations of chemical data or governmental regulations for inclusion in this report. Table 15 identifies agencies and individuals that contributed time and/or resources to facilitate the completion of this study.

6.3.3 Public Organization Participation

Various members of the Mahoning River Steering Committee supported the project by providing background information, technical comments, and assistance in recruiting a non-Federal sponsor. The contributions by each respective agency are shown in Table 16.

6.3.4 Private Industry Participation

As members of the Mahoning River Steering Committee, the following private industries and organizations supported the project by providing background information, and technical comments:

- WCI Steel, Inc.
- Hull and Associates
- CASTLO

6.3.5 Views of Reconnaissance Report by Public Agencies and Private Industry

This report was reviewed by Steering Committee members and comments collected. All comments are included in Appendix P. None of the commentators questioned the basic study conclusions. Many of these comments are reflected in this report, others would be addressed during the more detailed Feasibility Study, such as incorporating a capping technology for contaminated sediments buried along the shore as opposed to dredging that material, would likely be investigated in the feasibility phase. Steering Committee meetings will be an important aspect of the feasibility study. The overall consensus of the Steering Committee can be interpreted to be agreement by all participants that the proposed project meets local objectives.

6.4 Identification of Local Sponsor

Steering Committee members have been dedicated from the start towards locating a non-Federal sponsor that will allow the study process to continue. Two agencies, OEPA and EDATA, took the lead among non-Federal agencies toward this end. As of the date of this report, this process is on-going and the OEPA remains a key agency in support of a local sponsor. The sponsor must agree to pay one-half of the cost of the Feasibility Study, the next step in the restoration process. When a local sponsor is identified, the USACE will request a letter of interest. In this letter, the local sponsor will state its ability and willingness to undertake a Feasibility Study and request the participation of the USACE.