Upper Mississippi River
Water Quality Initiative

REPORT
of the
TOXIC POLLUTION
WORKSHOP

February 17-18, 1993

Airport Hilton

Bloomington, Minnesota

Sponsored by the
Upper Mississippi River Basin Association

Report of the
Toxic Pollution Workshop

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BACKGROUND

The member states of the Upper Mississippi River Basin Association have long recognized the need for enhanced efforts to protect the water quality of the Upper Mississippi River. While there are a variety of established regulatory and land treatment programs, there is no coordinated plan for maximizing their benefit to the Mississippi River. In May 1992, the first step toward addressing this need was taken when the states committed themselves to designing an integrated regional water quality protection strategy and set forth the goals and primary components of what is called the "Upper Mississippi River Water Quality Initiative." The states further agreed that the primary emphasis of such an effort should be on sedimentation and toxic pollution.

The Water Quality Initiative includes a planning process that will provide the foundation for future action. For both sedimentation and toxic pollution, the Association identified a series of strategic steps necessary for ultimately fashioning a regional water quality protection program. Each of these parallel processes begins with the establishment of specific reduction goals followed by the identification and prioritization of sources of pollution. The Association reasoned that agreement must first be reached on these questions before an effective action plan could be devised. (A copy of the Association's draft Water Quality Initiative Vision and Strategy is included as Appendix A.)

On February 17-18, 1993, the Association sponsored a workshop on toxic pollution in the Upper Mississippi River. The purpose of the workshop was to gain the assistance of the scientific and regulatory community in refining and more fully describing the initial strategic steps of the regional planning process. In addition, workshop participants were asked to reflect more generally on the efficacy of the Association's proposed approach. Specifically, the workshop was devoted to the exploration of the following strategies:

1) Reach agreement on a critical list of toxic pollutants and prioritize that list.

2) Set quantifiable toxic pollutant reduction goals.

3) Prioritize those areas and sources to target for toxic pollutant reduction.

4) Identify monitoring needs to support development, implementation, and evaluation of efforts to prevent, reduce, and control toxic pollution.

WORKSHOP PARTICIPANTS AND FORMAT

The Toxic Pollution Workshop was attended by 28 individuals, including 2 Association staff members and 2 facilitators. Although there were representatives from all five states, two key state agencies were unable to participate — the Missouri Department of Natural Resources and the Illinois Environmental Protection Agency. Federal agency representation included the U.S. Geological Survey, the U.S. Fish and Wildlife Service, and EPA Regions 5 and 7. In addition, the workshop included attendees from a water utility, a wastewater treatment authority, an environmental interest group, and a state university. A broad spectrum of expertise and experience was evident, including planners, program managers, biologists, chemists, and research scientists. (A complete list of attendees is included as Appendix B.)

The workshop included four major components. The initial session included presentations by scientists involved in contemporary research and analysis of toxic pollution on the Mississippi River. The subsequent "information exchange" session provided an opportunity for those in attendance to share their perspectives on which toxic pollutants are of particular concern and what sources of toxic pollution are most significant. The third portion of the agenda included breakout discussion groups designed to elicit participants' views on each of the Association's first four toxic pollution strategies. The final wrap-up session included discussion of the results of the breakout sessions, the general conclusions of the workshop, and additional recommendations which those assembled wished to make to the Association. (A complete workshop agenda is included as Appendix C.)

CAVEATS

The following report provides a summary of the conclusions and recommendations of those in attendance at the Toxic Pollution Workshop. While there is clearly room to expand and refine these conclusions and recommendations, this summary is limited to the ideas and perspectives actually expressed at the workshop. Given the diversity of perspectives represented by participants, the report reflects a blend of both professional judgement and the results of scientific investigations. Except where explicitly noted, references to specific sources, tributaries, or reaches of the Mississippi River are illustrative only and are not intended to suggest special priority or significance. Similarly, the data and research results that are noted are simply some of those offered at the workshop and do not necessarily reflect the full body of scientific investigations with bearing on the issue. Given the fact that a consensus did not readily emerge on every issue, all major conclusions and perspectives are discussed, together with sufficient background to understand the context in which the discussions unfolded.

TOXIC POLLUTANTS OF CONCERN

Toxic chemical contaminants in the Upper Mississippi River are of concern both from a human health and an ecosystem perspective. Drinking water is treated prior to human consumption, but the costs of such treatment are substantial. Furthermore, human health can be at risk from consumption of contaminated fish. For this reason, fish consumption advisories have become common along the Mississippi River and its tributaries. It is, however, the ecological impacts of toxic contamination that are increasingly alarming, both because they are so little understood and, in contrast to human health effects, often more difficult to prevent.

Recent studies suggest that toxic pollution is at least partially to blame for a variety of declines in riverine biota including mink populations, benthic macroinvertebrates (unionid mussels and fingernail clams), and mayflies. These recent declines are spatially widespread and reminiscent of past ecological events on the now degraded Illinois River. The Upper Mississippi River is an unhealthy ecosystem due in part to toxic contaminants.

Toxic pollutants are present in both water and sediment. The presence of toxic contaminants in suspended and bed sediments is of concern largely because of their resulting persistence in the ecosystem and potential threat to aquatic organisms. Contaminants can be transferred from the sediment to higher trophic levels via the benthic food chain. In the words of one workshop participant, "much of the ecosystem burden of contaminants is in the sediment."

In general, toxic pollutants include organic chemicals (such as PCBs and pesticides), toxic metals, and a few other inorganic substances that cannot be classified as either organic or metal (such as ammonia and nitrate). All three categories of toxic pollutants are present in the Upper Mississippi River. The following specific toxic substances were cited by workshop participants as contaminants of concern in the Mississippi River:

- PCBs (polychlorinated biphenyls)
- PAHs (polynuclear aromatic hydrocarbons)
- Dioxin
- Pesticides
  - DDT
  - Dieldrin
  - Atrazine
  - Alachlor
  - Chlordane
- Metals
  - Mercury
  - Lead
  - Cadmium
  - Copper
  - Nickel
  - Silver
  - Uranium
  - Zinc
- Ammonia
- Nitrate

SOURCES OF TOXIC POLLUTANTS

Toxic pollutants enter the Upper Mississippi River from both point and nonpoint sources. Point sources such as discharges from industrial facilities and municipal sewage treatment plants are largely responsible for many of the toxic metals in the river system, despite the fact that loadings have decreased. As an example, the Twin Cities wastewater treatment plant, which receives effluent from 500 - 700 industrial facilities, has reduced its loadings of heavy metals by 50 - 85 percent in recent years. However, the presence of toxic metals in sediments remains a concern.

Nonpoint sources include atmospheric deposition and urban runoff, in addition to the more widely recognized runoff from agricultural lands. Agricultural chemicals include an array of various pesticides and fertilizers. The contribution of these chemicals into the river system result in distinctive "signatures" for the major tributaries. Inputs of agricultural chemicals also generally surge in the spring when rainfall is abundant and land applications are highest.

Metropolitan areas are major sources of both point and nonpoint pollution. The significance of these sources is evident from the fact that riverine biota have been found to be most contaminated in reaches adjacent to or downstream from metropolitan areas.

Although toxic contaminants are continually being introduced to the river system, the contribution of "in-place" sources is generally believed to be significant. Toxic substances which accumulate over time in bed sediments can be resuspended or released and thus reintroduced into the water column. The original sources of these contaminants may be difficult to trace, but it is clear that once toxic substances accumulate in sediment, those contaminated areas can be considered toxic sources as well.

The specific geographic sources of individual toxic pollutants are subject to speculation. However, workshop participants offered the following general and, in some cases, locationally specific observations on sources of toxic pollutants in the Upper Mississippi River:

PCBs are generally believed to have been originally introduced by a combination of both point and nonpoint pollution including pulp mills, spills, and hazardous waste sites. Since PCBs were banned in 1976, they have persisted in the environment and accumulated in bed sediments, with high concentrations detected in Lake Pepin. The Ohio River has been identified by the USGS as the major contemporary source of PCBs to the Mississippi River.

PAHs are a diverse class of compounds introduced to the river primarily by urban stormwater runoff, abandoned hazardous waste sites, and from inland navigation fuel loading and unloading sites. High concentrations of PAHs are found in the bed sediment of the Mississippi River in Minneapolis-St. Paul.

Dioxin comes primarily from pulp and paper mills. At this time, dioxin is of concern principally in tributaries, such as the Wisconsin River, where such mills are located.

Pesticides are primarily the result of runoff from agricultural lands throughout the basin. For example, roughly 2 percent of triazine herbicides which are applied wind up in the river. However, the presence of a number of these chemicals can also be attributed to urban nonpoint sources. The exception is **atrazine** which is largely an agricultural chemical. Since atrazine is marketed predominantly in rural areas, its presence in metropolitan surface waters suggests that it may also be introduced by atmospheric deposition. **Chlordane** has been predominantly associated with urban nonpoint pollution and has been attributed to its use in termite control.

Mercury sources include atmospheric deposition, urban and agricultural chemical runoff, and industrial and municipal wastewater treatment facilities. In addition, the release of mercury from sediments is a significant source of contamination.

Lead was used as a primer in oil-based paints and can enter the Mississippi when bridges are sandblasted. It can also be introduced from industrial and municipal wastewater treatment facilities and from runoff in urban areas where soils are contaminated from years of leaded gas use in automobiles. In addition, lead mining near Galena, Illinois and areas south of St. Louis contributes to the river's lead pollution both through runoff and the deposition of airborne contaminants from smelters. Roughly two to three times as much lead is moving in the system on colloids than is dissolved in water. Lead contamination of bed sediments has been noted as a problem in Lake Pepin, Pool 12, and Pool 19.

Cadmium, like other metals, can naturally be found in soils. However, cadmium's use in recent technologies suggests urban point source discharges are generally responsible for its presence in the river. Elevations in the cadmium content of bed sediments have been found at a number of sites including the metropolitan areas of the Twin Cities, Quad Cities, and St. Louis.

Copper is primarily introduced by urban point sources, partly as a result of industrial and sewage treatment plant effluents and corrosion in water supply delivery systems. However, there is some speculation that copper may become an increasing problem as a result of its use on boat hulls as a biocide for zebra mussels and algae.

Nickel is one of the most common metals occurring in surface water. It is often used in electroplating and is thus introduced into the river system largely through industrial point source or municipal sewage treatment discharges in addition to its natural sources.

Uranium concentrations are particularly high in the Minnesota River with speculation that there may be a geologic source within that watershed. Phosphate fertilizers also contain large amounts of uranium.

Ammonia can be introduced by point source discharges such as wastewater treatment plants. Ammonia in bed sediments is of particular concern. The presence of ammonia in sediment pore waters may be the result of the decay of nitrogenous organic matter of point and nonpoint origins.

Nitrate is generally synonymous with fertilizers and animal wastes and is thus predominantly an agricultural nonpoint pollution problem. However, municipal and industrial wastewater treatment facilities can also be sources. As much as one quarter of the nitrate that is applied to agricultural lands runs off into surface waters. Nitrate is particularly high in the Illinois River and other tributaries. While Iowa's interior streams occasionally show exceedances of the maximum contaminant level for nitrate, no violations have yet been detected on the Iowa reach of the Mississippi River.

TOXIC POLLUTANT PRIORITIES

(Strategy 1: Reach agreement on a critical list of toxic pollutants and prioritize that list.)

Implicit in the task of prioritization is the use of criteria against which to make such judgements. In the case of toxic pollutants, the following considerations may apply:

- Feasibility — Is the management, regulation, or remediation of the effects of the toxic substance feasible or practical?
- Geographic Scale — Are the presence and adverse impacts of the pollutant widespread or are they of more localized concern?
- Cost — What are the relative costs associated with control of the pollutant?
- Cause and Effect — How strong is the linkage between the presence of a pollutant and the observed toxic effects?
- Violations — Should priorities be limited to those substances for which violations of established standards have been documented?
- Measurability — Can the presence and change in the levels of the pollutants be easily detected? Similarly, are changes in the impacts of the pollutant measurable?
- Risk — What are the relative risks to human health or riverine biota?
- Human vs. Ecosystem Health — Should human and ecosystem health be differentially valued?
- Accommodation of change — How can or should priorities reflect scientific uncertainties and the future introductions of new contaminants.

While these issues suggest a variety of criteria upon which priorities could be based, none were explicitly used in developing the following list of priority toxic pollutants. In the absence of policy guidance from the Association, professional judgements were made that most likely reflect an informal integration of these factors. The following toxic pollutants are generally considered to be of the highest priority on the Upper Mississippi River:

<u>Toxic Pollutants of Priority Concern for Human Health</u>

Toxic pollutants can affect human health either because they contaminate drinking water supplies or because they accumulate in the fat or tissue of fish which are consumed by human

populations. Both problems are of concern on the Upper Mississippi River. The primary toxic substances of concern due to fish consumption are currently **PCBs** and **chlordane**. PCBs are the primary reason for fish consumption advisories for the Mississippi River in Minnesota, Wisconsin, and Iowa, while chlordane is the predominant reason for such advisories in Illinois and Missouri. Although dieldrin is currently the basis for fish consumption advisories only in Illinois, if other states adopt EPA's risk assessment methods for evaluating fish contaminant data, dieldrin may replace chlordane as a priority for protection of human health. **Mercury**, contamination is generally the basis of fish consumption advisories on the Mississippi River only north of the Twin Cities.

The second category of toxic pollutants which is of concern to human health includes those substances that pose threats to drinking water. Based upon the fact that they have either shown exceedances of maximum contaminant levels (MCLs) or had a significant impact on water treatment needs, **atrazine** and **nitrate** are considered to be of top priority. Both produce localized and seasonal problems, but are of basin-wide concern. Nitrate is additionally of priority concern because recent research suggests that the Upper Mississippi River is a major source of nitrogen in the Gulf of Mexico.

Toxic Pollutants of Priority Concern for Riverine Biota

Toxic substances which are consistently cited as priority concerns due to their impact on the ecosystem are **ammonia** and metals, more specifically, **mercury** and **cadmium**. Their selection as priorities is based upon the fact that there is evidence that they either are associated with biotic problems or exceed water quality standards for aquatic life.

The toxicity of ammonia is a function of pH and temperature. While ionic ammonia is not particularly harmful to fish, it can readily be converted to unionized ammonia as temperature or pH increase. Unionized ammonia is considered very toxic to aquatic life and is present in sediments and pore waters. High concentrations of mercury and cadmium have been found throughout the river system in both fish and emergent mayflies, a species which is generally considered to be an indicator of ecosystem health.

In addition to ammonia and metals, both **PCBs** and **herbicides** are contaminants which threaten the health of riverine biota. Herbicides are suspected to be responsible for the destruction or weakening of aquatic vegetation. Although both PCBs and herbicides have been identified as priority toxic pollutants from a public health perspective, they are not as universally regarded as priorities in terms of ecosystem health.

REDUCTION GOALS

(Strategy 2: Set quantifiable toxic pollution reduction goals.)

In one respect, it can be argued that goals for the reduction of toxic pollutants already exist, in so far as they may be expressed in the form of standards established by the states. However, there continue to be ecosystem and human health problems despite the fact that there are generally not widespread and persistent exceedances of current numeric water quality standards. This disparity clearly indicates that existing water quality standards alone do not offer sufficient protection nor adequately express our goals. Some argue that this failure can be attributed to the fact that water quality standards do not fully protect sediment quality and there are significant limitations to our existing knowledge of the fate of many toxic contaminants and how they effect biological communities. Despite these limitations, it is recommended that, as an initial step, **the five Upper Mississippi River states establish consistent water quality standards and procedures for implementing them.**

Consistency of the standards themselves is a necessary, albeit challenging, fundamental first step for addressing the water quality of any shared water body such as the Mississippi River. However, the significance of differences in state standards is entirely overshadowed by the lack of a shared implementation strategy. Standards consistency is important only as a means of ultimately achieving uniform allocation procedures. Currently, each state, through its permitting process, makes individual and independent permit allocations. This can result in overallocation of the river's assimilative capacity.

It is recognized that the goal of consistent water quality standards and a uniform process for toxic wasteload allocations for the Upper Mississippi River is tremendously ambitious. However, in addition to the improvements it will yield in water quality, the approach has a variety of secondary benefits. For example, such consistency would alleviate both the existing and potential economic competition associated with the siting of manufacturing and industrial facilities under different regulatory environments.

In the process of developing the recommendation for consistency of standards and their implementation, a number of other approaches were considered or proposed. While none of them represent specific numerical reduction goals, they could be means of achieving reductions and are thus offered for future consideration:

- Insure that no Mississippi River tributary contributes above the maximum contaminant level (MCL) or state standard for pollutants of concern
- Achieve consistency in state fish consumption advisories
- Eliminate combined sewer overflow and insure that stormwater is treated

- Revise the process for approval of new pesticides to facilitate the replacement of older pesticides with less damaging alternatives
- Promote sustainable agriculture
- Seek special Congressional priority for the Mississippi River
- Regulate feedlots
- Mandate land use controls such as buffer strips and stream fencing
- Recalculate water quality standards with reference to sensitive species
- Establish urban nonpoint source pollution controls and education
- Establish total maximum daily loads (TMDLs) for reaches of the river that are heavily allocated

SOURCE PRIORITIES

(Strategy 3: Prioritize those areas and sources to target for toxic pollutant reduction.)

It may be premature to identify and prioritize individual watersheds, dischargers, or even categories of sources. Rather, the following general recommendations are offered:

Urban Areas — In so far as a number of the priority toxic pollutants are contributed by urban runoff and discharges from industrial and municipal wastewater treatment facilities, the three major metropolitan areas of Minneapolis-St. Paul, the Quad Cities, and St. Louis should be the focus of special effort. A total maximum daily load (TMDL) approach for these three urban areas may be an effective means of addressing the problem of overallocation of the river's assimilative capacity. However, the establishment of numeric standards is a prerequisite to development of TMDLs.

Agricultural Lands — Each watershed has its own unique pollutant problems and soil and topographic conditions. Therefore reduction strategies should be formulated by watershed. This type of holistic approach would recognize the diversity of conditions and thereby yield the most effective results. It would also accommodate the need to integrate surface and groundwater protection strategies. It may also be useful to consider existing or additional demonstration projects to assess the impacts of various land management practices in reducing runoff of agricultural chemicals.

Sediment — Bed sediments in the Upper Mississippi River are a significant source of toxic pollutants. Therefore, even if all point and nonpoint introductions of toxic substances were eliminated, contamination problems would persist and the riverine ecosystem would recover very slowly. It will therefore be necessary to specifically address the unique research, regulatory, and management issues associated with sediment contamination.

MONITORING

(Strategy 4: Identify monitoring needs to support development, implementation, and evaluation of efforts to prevent, reduce, and control toxic pollution.)

There is strong support for establishment of a coordinated **ambient monitoring network**. Such a network would expand and maximize the utility of existing state, federal, and local efforts. A comprehensive monitoring system would require coordination of the timing of sampling and state-of-the-art uniform procedures for sampling, handling, and analysis. It will also be important to obtain flow measurements during monitoring because, while measurements of the concentration of pollutants are important to regulators, loadings data are important for management decisions.

In addition to establishment of a coordinated monitoring network, the following additional monitoring and research needs were identified:

- Consolidation of existing contaminant data into centralized data base
- Expansion of volunteer monitoring efforts
- Monitoring of demonstration projects to detect pulse effects in addition to routine nonpoint source monitoring
- Pore water sampling
- Monitoring of biological community structure
- Research on the impacts of toxic substances on riverine biota

ADDITIONAL RECOMMENDATIONS AND OBSERVATIONS

SEDIMENT — The unique issues associated with sediment contamination require special attention. The workshop recommendation regarding consistency of water quality standards will not fully address toxic pollution due to the fact that many of the problems associated with toxic pollution of the river are a result of contaminated sediments already within the river system. However, sediment standards are a particularly difficult technical problem and national guidance and procedures are still under development. Consideration should therefore be given to the establishment of a separate working group devoted to sediment quality issues. The work of such a group would be most productive if it were to follow, rather than parallel, the water quality standards effort. The UMRCC Water Quality Technical Section is currently working on the development of a contaminated sediments data base and their efforts may serve as a starting point for future actions.

Furthermore, it should be recognized that sediment quality is only one dimension of the sediment problems in the Upper Mississippi River System. The physical or hydrologic, as well as chemical, implications of sediment will require a comprehensive sediment management strategy.

FECAL COLIFORM — Although fecal coliform bacteria is not considered to be a toxic pollutant, it is of significant concern on the Upper Mississippi River because it is a surrogate measurement for other pathogenic bacteria. If not addressed in the context of the toxic pollution reduction initiative, it should be the target of an independent parallel effort. The St. Louis metropolitan area has particularly high levels of fecal coliform bacteria and the Missouri River is a large potential source as well. Lack of chlorination by Missouri wastewater treatment plants has been cited as a concern, although alternative treatments may be appropriate to protect some aquatic organisms which are sensitive to chlorine. Wastewater treatment plants along the Iowa portion of the river also do not chlorinate effluents because background levels of fecal coliform bacteria often exceed Iowa's water quality criteria and it has been demonstrated that municipal effluents do not raise those levels.

PHOSPHORUS — Although phosphorus is not a toxic pollutant, it is frequently tightly bound to sediments and its presence can cause toxic conditions. During the recent drought of 1988, phosphorus was identified as the cause of algae blooms in Lake Pepin which resulted in the extinction of macrophytes and a massive fish kill. It is estimated that during normal flow conditions, 30 percent of the phosphorus in Lake Pepin is contributed by the Twin Cities metro treatment plant. That number rises to 60 percent during drought conditions.

AGRICULTURAL CHEMICALS — Although atrazine is consistently cited as a priority toxic pollutant, a variety of other herbicides, pesticides, and their "degradation" products are also of concern. Part of the explanation for the focus on atrazine may be that in the recent USGS study of herbicides in the Mississippi River, atrazine was the only one that was found to exceed the MCL. It is also currently the most widely used herbicide in 12 states draining to the Mississippi River. Nevertheless, it is important that the potential

effects of other agricultural chemicals not be overlooked, particularly in light of the fact that new generation pesticides are being introduced on the market. Additional information is needed on the presence, transport mechanisms, and toxicity of these chemicals. It will also be important to evaluate the synergistic effects of the complex mixtures of agricultural chemicals. Such questions are not addressed by toxicity testing of individual chemicals.

FUTURE EFFORTS — The resources and level of effort required to proceed further with the development of a toxic pollution reduction strategy are significant. While the experience of the states involved in the Great Lakes Initiative has not been totally satisfying, and the approach utilized in that basin may not be appropriate for the Mississippi River, it certainly suggests that such an undertaking cannot be accomplished in an ad-hoc fashion. Substantial commitments of staff resources will be required and an explicit expression of purpose is necessary. It is therefore recommended that the next step in the Upper Mississippi River Water Quality Initiative be to secure from each basin state a clear and definitive commitment to this effort, at the highest policy level.

Appendix A

UPPER MISSISSIPPI RIVER WATER QUALITY INITIATIVE

VISION STATEMENT AND STRATEGIES

UPPER MISSISSIPPI RIVER WATER QUALITY INITIATIVE

The Vision

Recognizing the Upper Mississippi River as a unique and nationally significant ecosystem, the five member states of the Upper Mississippi River Basin Association are committed to ensuring the long-term viability and balanced multiple use of the river as a sustainable, diverse, and healthy resource for the benefit of the nation's and the region's economy and ecology. Toward this end, the Basin states will work cooperatively with both the public and private sectors to maintain and enhance the river's water quality based on an understanding of the Upper Mississippi River's integral relationship to its tributaries and surrounding lands.

Priority Water Quality Problems

In an effort to realize this vision for the river, the member states of the Upper Mississippi River Basin Association have identified two priority water quality problems on which to focus their initiative. These two problems, **sedimentation** and **toxic pollution**, endanger the future of the the Upper Mississippi River as a diverse and healthy ecosystem able to support a variety of natural resource and human needs.

Sedimentation is widely regarded as one of the most significant threats to the long-term health of the Upper Mississippi River ecosystem. Erosion is widespread throughout the basin, with sediment sources including the region's extensive agriculture and forest products industry, its urban areas, and the banks of the river and its tributaries. The Upper Mississippi River is particularly vulnerable to sedimentation not only because it drains such a vast land area but because its system of locks and dams inhibits the river's natural sediment transport capacity. As a result, the river's extensive network of backwater lakes, ponds, and sloughs, which provide invaluable habitat for fish and wildlife, is suffering from significant sediment accumulation. Sedimentation in these backwater areas has already resulted in substantial loss of habitat diversity. In addition to the damage caused in backwaters, sediment also accumulates in the main channel of the river, requiring significant annual expenditures on dredging to maintain the 9 foot navigation channel.

Toxic pollution is the other priority focus of the Upper Mississippi River water quality initiative. The list of toxic compounds found in the river is long and includes substances that come from specific point sources as well as from both urban and rural nonpoint sources. Some toxics, such as heavy metals associated with wastewater treatment discharges, are introduced to the river on an almost continuous basis, while organic pesticides and some others follow seasonal patterns of residential and agricultural chemical use. Still other pollutants, such as PCBs, have been banned for years and yet are still found in the river, often adsorbed to suspended and bed sediments. Toxic pollution can cause immediate health and environmental damage in acute cases. More often, however, the threat to both the river's fish and wildlife and to humans is from prolonged exposure to sub-lethal concentrations. The actual impacts from chronic exposure to a multitude of contaminants are largely unknown.

Strategies for Addressing the Priority Problems

The Upper Mississippi River is a vast and complex ecosystem, thus requiring a comprehensive, coordinated approach to successfully address its water quality problems. At the same time, such an approach is itself a major undertaking, requiring innovation and cooperation by all levels of government as well as by industry, agriculture, environmental groups, citizens, and other interested parties. In addition, it is essential that this approach reflect a careful balancing of costs and benefits in order to ensure that limited resources are utilized in a cost-effective manner.

Outlined below are several strategic steps for beginning to address the priority problems of sedimentation and toxic pollution. These steps are designed to involve the relevant management agencies, interest groups, and private sector concerns in crafting an action strategy to reduce both sedimentation and toxic pollution. Clearly this planning process is only the first phase in a comprehensive water quality initiative. Upon completion of the planning phase, the greater challenge of implementing and achieving the goals set forth will remain.

Sedimentation Strategies

1) Establish quantifiable tributary and mainstem sediment loading goals.

2) Prioritize those areas and watersheds to target for sediment reduction.

3) Refine and coordinate monitoring as necessary to support development, implementation, and evaluation of sediment reduction efforts.

4) Coordinate, integrate, and focus existing programs in order to maximize the sediment reduction benefit realized by the river from such programs.

5) Gain agreement among public agencies, industry, agriculture, environmental groups, and other interested parties on how to implement sediment reduction in the targeted areas. This might include coordination of existing programs as well as new initiatives.

6) Conduct a public information and education campaign. This will be an on-going effort throughout the planning phase and will be tailored to the demands of each step. It will also be coordinated with the outreach and education efforts related to the toxic pollution component of the initiative.

Toxic Pollution Strategies

1) Reach agreement on a critical list of toxic pollutants and prioritize that list.

2) Set quantifiable toxic pollutant reduction goals.

3) Prioritize those areas and sources to target for toxic pollutant reduction.

4) Refine and coordinate monitoring as necessary to support development, implementation, and evaluation of efforts to prevent, reduce, and control toxic pollution.

5) Coordinate, integrate, and focus existing programs in order to maximize their contribution to the prevention, reduction, and control of toxic pollution in the river.

6) Gain agreement among public agencies, industry, agriculture, environmental groups, and other interested parties on how to implement toxic pollution reduction in the targeted areas. This might include coordination of existing programs as well as new initiatives.

7) Conduct a public information and education campaign. This will be an on-going effort throughout the planning phase and will be tailored to the demands of each step. It will also be coordinated with the outreach and education efforts related to the sedimentation component of the initiative.

Appendix B

LIST OF ATTENDEES
at the
TOXIC POLLUTION WORKSHOP

List of Attendees

Upper Mississippi River Water Quality Initiative
Toxic Pollution Workshop

February 17-18, 1993
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Appendix C

AGENDA
for the
TOXIC POLLUTION WORKSHOP

February 17-18, 1993

Airport Hilton

Bloomington, Minnesota

UPPER MISSISSIPPI RIVER
WATER QUALITY INITIATIVE

TOXIC POLLUTION WORKSHOP

AGENDA

Wednesday, FEBRUARY 17

Background (Cedar Room)

9:00 a.m. • Welcome and Introductions

9:10 • Overview of the Upper Mississippi River Water Quality Initiative — Ron Nargang, Chair, Upper Mississippi River Basin Association

9:20 • Purpose of the Toxic Pollution Workshop

9:40 • Presentations by Scientists and Researchers
- *Organic Contamination of the Mississippi River from Industrial and Municipal Wastewater* — Jerry Leenheer, U.S. Geological Survey
- *Trends in Contamination and Potential Effects on Riverine Biota* — Jim Wiener, U.S. Fish and Wildlife Service

10:45 • Break

Information Exchange (Cedar Room)

11:00 • Identification of Toxic Pollutants of Concern in the Upper Mississippi River (UMR)
- participants share lists of critical pollutants
- reasons and justifications supporting each state or agency's list
- state standards for critical toxic pollutants

11:30 • Discussion of Key Sources of Toxics in the UMR
- point sources
- nonpoint sources
- in-place problems

12:15 • Lunch (Meeting Room #5)

1:15 p.m. • Review of Current State and Federal Efforts to Address Toxic Pollutants in the UMR
- discharge permitting
- nonpoint source pollution programs
- remediation
- potential for enhanced coordination
- limitations of existing programs

2:15 • Break

Discussion/Brainstorming (Breakout Sessions) (Cedar Room & Meeting Room #4)

2:30 p.m.
- Toxic Pollution Strategy #1 - *Reach agreement on a critical list of toxic pollutants and prioritize that list.*
  - Is there strong agreement on the priority toxics for the UMR or is more data required?
  - Are there different priority lists for different segments of the river? If so, what are the appropriate river segments and their associated critical toxic pollutants?
  - Recommendations for further action

3:00
- Toxic Pollution Strategy #2 - *Set quantifiable toxic pollutant reduction goals.*
  - Are existing standards an appropriate way of expressing reduction goals? Does the way in which reduction goals are expressed substantially affect the choice of management strategies?
  - If goals other than standards are judged to be needed, what additional research and data are needed to support establishment of such quantified reduction goals? How might an integrated system for securing and evaluating that data be established?
  - Should goals be established by river segment?
  - Recommendations for further action

4:00
- Toxic Pollution Strategy #3 - *Prioritize those areas and sources to target for toxic pollution reduction.*
  - Are separate reduction strategies necessary for each priority toxic pollutant?
  - What factors should be considered in setting toxic pollution reduction priorities?
  - What constraints limit our ability to target specific sources or areas?
  - Recommendations for further action

4:45
- Toxic Pollution Strategy #4 - *Identify monitoring needs to support development, implementation, and evaluation of efforts to prevent, reduce, and control toxic pollution.*
  - Is the coverage and coordination of current monitoring efforts adequate?
  - What are the most significant unmet monitoring needs?
  - Recommendations for further action

5:30
- Adjourn for the Day

5:45-7:00
- Informal Reception and Cash Bar (Meeting Room #5)

Thursday, FEBRUARY 18

Final Recommendations and Wrap Up Discussion (Ballroom B)

8:30 a.m. • Summary of February 17th Breakout Sessions

9:00 • Next Steps for the UMR Water Quality Initiative
- How can the specific recommendations under Strategies 1-4 best be integrated?
- Should any working groups be established at this time?
- How should the input, perspective, and support of the broader range of interested parties (e.g., industry, environmental groups, citizens, and local governments) be sought?
- Are there additional recommendations that the workshop participants would like to make to the Upper Mississippi River Basin Association?

10:00 • Integration of Toxic Pollution and Sedimentation Components of the UMR Initiative
- What are the critical linkages between these two resource problems?
- How should the strategies for each be integrated?
- What fundamental distinctions must be observed?

11:15 a.m. • Closing Remarks