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ANNOTATED REPORT AND DATA INVENTORY FOR THE MISSISSIPPI AND MINNESOTA RIVERS, MINNEAPOLIS-ST. PAUL METROPOLITAN AREA

By T. A. Winterstein

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ABSTRACT

This inventory of reports and data concerning the Mississippi and Minnesota Rivers in the Twin Cities metropolitan area was compiled from November 1981 through January 1982 for a planned cooperative river-quality assessment by the U.S. Geological Survey and the Metropolitan Waste Control Commission. There are 260 annotated citations: 176 citations of reports; 8 citations of computer models that have been used to model either or both rivers; and 76 citations of data in reports, in field notes, lab sheets, or handwritten tabulations, and in computer data bases. Citations of all the reports and data that might conceivably be useful in understanding and interpreting the biological and chemical quality of the Mississippi and Minnesota Rivers in the past, present, or future were included. The accuracy of the citations was not verified, and secondary sources, such as other annotated bibliographies, were used in compiling this inventory.

INTRODUCTION

This inventory of reports and data concerning the Mississippi and Minnesota Rivers in the Twin Cities metropolitan area was compiled from November 1981 through January 1982 for a planned cooperative river-quality assessment by the U.S. Geological Survey and the Metropolitan Waste Control Commission. Because this inventory was intended to be used only as a planning aid for assessing river quality, the accuracy of citations was not verified, and citations developed from secondary sources, such as other annotated bibliographies, were used. As a result, citations of reports and data in this inventory may be in error.

The inventory was compiled primarily by contacting agencies that might have information about either the Minnesota or Mississippi River in the metropolitan area. Persons in the agencies were interviewed and the libraries of the agencies searched to locate both reports and data. The second source of information was annotated bibliographies located during the literature and data search. The citations obtained from these annotated bibliographies are identified in the inventory by an asterisk after the report number. The third source of information was the bibliographies of reports reveiwed for this inventory. Reports and data located by this method are identified by two asterisks after the report number. Finally, a data retrieval from the National Water Data Exchange (NAWDEX) data base was made to locate the data collected from the Mississippi and Minnesota Rivers in the Twin Cities metropolitan area stored on either the WATSTORE or STORET data bases. The NAWDEX retrieval is bound as a separate appendix.

The areas of interest were the Mississippi River from Anoka to Hastings, Minn., and the Minnesota River from Jordan, Minn., to its mouth. A few reports are cited that cover reaches of these rivers outside the study area because these reports were the only source of information about a particular aspect of the water quality of the rivers. At the

time the inventory was compiled, the particular aspects of river quality to be studied had not been determined. Therefore, citations of all the reports or data located that might conceivably be useful in understanding and interpreting the biological and chemical quality of the Mississippi and Minnesota Rivers in the past, present, or future were included.

ACKNOWLEDGMENTS

The following organizations were contacted during the literature search and contributed information to the inventory:

Metropolitan Waste Control Commission
Metropolitan Council of the Twin Cities Area
Minnesota Pollution Control Agency
Minnesota Department of Natural Resources
University of Minnesota
Northern States Power Company
Soil Conservation Service
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
Upper Mississippi River Basin Commission
U.S. Geological Survey

The following helped with the inventory by locating reports and data held by their organizations: Metropolitan Waste Control Commission, Helen Boyer, Drew McAvoy, and Dave Karras; Metropolitan Council of the Twin Cities Area, Gary Oberts and Jack Frost; Minnesota Pollution Control Agency, Dave Maschwitz and Jerry Winslow; Minnesota Department of Natural Resources, Jack Skrypek, Steven Hanson, and Jack Enblom; University of Minnesota, Dr. Heinz Stefan; Northern States Power Company, Ed Schentzel; U.S. Fish and Wildlife Service, Ken Carr; U.S. Geological Survey, Greg Payne and Rob Brown.

ORGANIZATION

The inventory is divided into three main sections: report citations, computer-model citations, and data citations. Report citations are arranged in alphabetical order by author or sponsoring agency and have been assigned an index number. Each citation contains bibliographic data, a report summary, and listings of data-type keynumbers and subject keywords. Each computer-model citation contains information on the model type, model developer, who has the model, the status of the model, model documentation, and a description of the model. The data citation section is divided into subsections for each of the following data forms: data in reports, data in report series, data in manual form (that is, field notes, lab sheets, handwritten tabulations, etc.), data in computer data bases, and miscellaneous data. Within each subsection, data citations are grouped alphabetically by agency and have been assigned an index number. Each citation contains a description of the data, where the data is held, and data-type keynumber.

Two indexes are provided as an aid to finding information about particular topics in the report and data sections. The index for the report section is organized alphabetically by keywords. The keywords were selected to describe the important topics covered by the report, such as the geographic area discussed in the report, and the type of data in the report.

The index for the data section is organized by keynumbers that correspond to one of the data categories listed before the data index. The data types listed under each data category indicate the extent and type of data in that category. These data categories were developed at the beginning of the literature and data search by dividing the chemical, biologic, and physical data in the Metropolitan Waste Control Commission Quality Control Department's Annual Water Quality Report into groups based on the type of data and the likelihood of data being collected together. For example, chemical nutrients are grouped together and are further broken down into nitrogen and phosphorus compounds. As the literature and data search progressed, new categories were added.

Published reports were cited in the report section if the report was primarily interpretive. If the report was primarily a means for publishing data, it was cited in the data section. Data in reports cited in the report section are indexed either by keyword in the report section index, by keynumber in the data section index, or both.

SECTION 1.—REPORT CITATIONS

1. Anderson, D. D., Whiting, R. J., and Jackson, B., 1981, An assessment of water-quality impacts of maintenance dredging on the upper Mississippi River in 1978: U.S. Army Corps of Engineers, St. Paul District, 171 p.

Report Summary: In 1978, hydraulic and clamshell dredging operations were monitored for water-quality changes in the river at five sites (UM 664 to 852). No significant changes in water quality were found below the dredging sites. A bottom sediment reconnaissance was conducted for many historical dredging sites. Location on the river and the amount of fine materials (silts and clays) were found to strongly influence contaminant levels in the main channel of the river. Data are presented in short tables and figures.

Data Types: 1a, 1c, 1d, 1e, 2, 3a, 4d, 5, 7b.

Keywords: Mississippi River, dredging, chemical data, bottom sediment, water quality.

2. Anderson, D. D., Whiting, R. J., and Nosek, J., 1981, An assessment of water-quality impacts of maintenance dredging on the upper Mississippi River in 1979: U.S. Army Corps of Engineers, St. Paul District, 93 p.

Report Summary: The Corps of Engineers investigated the water-quality impacts of hydraulic and clamshell dredging operations at five selected sites on the upper Mississippi River (UM 746 to 850) in 1979. No significant changes were found in the water quality below the dredging site from the water quality of the river above the dredging site. The effluent from dredge-spoils disposal areas were found to raise the levels of nitrates, ammonia, PCB's, and dieldrin, just downstream from the disposal area. Bottom sediment reconnaissance of dredge sites with a dredging frequency greater than 10 percent indicated that higher levels of contaminants were closely associated with finer sediment. A summary of past studies is included. Data are presented in short tables and graphs.

Data Types: 1a, 1c, 1d, 1e, 2, 4c, 4d, 5, 7b.

Keywords: Mississippi River, dredging, physical data, chemical data, PCB's, bottom sediment, water quality.

3. Barr, Douglas W., Consulting Engineer, 1964, Report on ground-water inflow, lower Minnesota River: Lower Minnesota River Watershed District, 12 p.

Report Summary: Based on 1964 data, ground-water inflow to the Minnesota River downstream of Carver, Minn. is between 103 and 152 cubic feet per second. Lowest inflow during extemely dry weather is estimated to be between 25 and 90 cubic feet per second.

Keywords: Minnesota River, base flow.

4**. Blad, B. L., and Baker, D. G., 1971, A three-year study of net radiation at St. Paul, Minnesota: Journal of Applied Meteorology, v, 10, p. 820-824.

Report Summary:

Keywords: Metropolitan area, weather data.

5. Brauer and Associates, Inc., 1977, Draft environmental impact statement for Barton Enterprises, "Proposed drum asphalt plant in the Red Rock Industrial District: Port Authority of St. Paul, 235 p.

Report Summary: This report is an environmental impact of building a drum asphalt plant and tank farm on Pig's Eye Lake. The impact to water quality and biota in Pig's Eye Lake is briefly (3 pages) discussed.

Keywords: Pig's Eye Lake, environmental impact statement.

6**. Claflin, T. O., 1977, The turbidity effects of hydraulic dredging of navigation pool no. 2, upper Mississippi River: U.S. Army Corps of Engineers, St. Paul District.

Report Summary:

Keywords: Turbidity, dredging, pool 2, Mississippi River.

7. Crohurst, H. R., 1932, A study of the pollution and natural purification of the upper Mississippi River; surveys and laboratory study: U.S. Treasury Department, Public Health Service, Public Health Bulletin No. 203, 113 p.

Report Summary: Data were collected from June 1926 to August 1927 from the Mississippi River above Minneapolis to Winona, Minn. The purpose of the data collection was to determine (1) sanitary conditions in the river due to discharge of untreated sewage and industrial wastes from the Twin Cities metropolitan area, especially during periods of low water, (2) the distance downstream that the effects of pollution were noticeable, and (3) the probable further effect of increasing sewage loads. The purpose of the report is to analyze the data from the standpoint of a study of stream pollution and natural stream purification. Data is presented in the form of short tables and figures.

Data Types: 1a, 1b, 1c, 3a, 3b, 4b, 9.

Keywords: Mississippi River, Minnesota River, St. Croix River, water quality, historical data.

8**. Delfino, J. J., 1970, Effects of river discharge and suspended sediment on water quality in the Mississippi River, Journal of Environmental Science and Health, v. 12, p. 79-95.

Report Summary:

Keywords: Mississippi River, water quality, sediment.

9. Dexter, R. N., Hines, W. G., Quinlan, E., and Pavlou, S. P., 1978, Dynamics of polychlorinated biphenyls in the upper Mississippi River, Phase I, Task 2: Evaluation of completed information: U.S. Fish and Wildlife Service, Columbia National Fishery Research Laboratory, Columbia, Missouri, 77 p.

Report Summary: This document is the final report of the second part of the planning phase of a long-term study supported by the Columbia National Fish Research Laboratory of the U.S. Fish and Wildlife Service designed to develop a diagnostic model for predicting the distribution and impact of toxic organic substances in the upper Mississippi River. This report provides a critical evaluation and synthesis of pertinent current and historical information to provide an overview of the physical characteristics, including hydrology and sediment transport, and the distribution and transport of polychlorinated biphenyls in the study area, with emphasis on Lake Onalaska in Pool 7.

Keywords: Mississippi River, water quality, PCB's, historical data.

10. Dexter, R. N., Pavlou, S. P., Hines, W. G., and Anderson, D. A., 1978, Dynamics of polychlorinated biphenyls in the upper Mississippi River, Phase I, Task 1: Compilation of information: U.S. Fish and Wildlife Service, Columbia National Fishery Research Laboratory, Columbia, Missouri, 65 p.

Report Summary: The report contains an annotated bibliography of articles, papers, and reports compiled for review. It also contains a list of individuals contacted to obtain information on recent and ongoing research. The annotated bibliography is divided into the following areas: (1) polychlorinated biphenyls, (2) hydrology-sediment transportations, (3) biology, (4) ecosystem modeling, (5) water quality, and (6) general and miscellaneous. The study site is from UM 701 to 770.

Keywords: Mississippi River, water quality, bibliography, PCB's.

11**. Drake, J., and Wilson, J. H., 1948, Pollution of the Mississippi River, Hastings to LaCrosse, November 1947-January 1948: Minnesota Department of Health, Division of Water Pollution Control, mimeographed report.

Report Summary:

Keywords: Mississippi River, water quality.

12. Ecology Consultants, Inc., 1978, Effects of navigation in inland waterways on the environment and related water-quality parameters; An annotated bibliography: Upper Mississippi River Basin Commission, 152 p.

Report Summary: Annotated in this bibliography are 264 publications that are about the effects of navigation in inland waterways on the environment or some aspects of the relationship between the two (for example, water quality). A keyword index is provided.

Keywords: Bibliography, navigation effects.

13. Envirodyne Engineers, 1980, Preliminary draft environmental impact statement: Metropolitan Waste Control Commission, 192 p.

Report Summary: The report discusses the environmental impacts of combined sewer overflows from St. Paul and South St. Paul, Minn., and residual solids management for the Twin Cities area. The impacts of several alternatives for each problem area are discussed.

Keywords: Mississippi River, water quality, forecasting, environmental impact statement, combined sewers.

14. Federal Water Pollution Control Adminstration, 1966, A report on pollution of the upper Mississippi River and major tributaries: U.S. Department of the Interior, 312 p.

Abstract: The purpose of the study was to (1) determine the extent of pollution on the Mississippi River between the Rum and Chippewa Rivers, on the Minnesota River from Mankato downstream to the mouth, on the St. Croix River from Taylors Falls to its mouth; (2) investigate the principal sources of pollution and contributions from these sources; (3) determine the effects of pollution on the numerous water users; and (4) develop programs for the achievement of various water uses on rivers of the study area. Data on the strength and kind of waste discharges, and water-quality constituents of the rivers studied are in the form of short tables and figures. Predictions for various water-quality parameters are made.

Data Types: 1, 2, 3a, 3b, 6a, 6d, 6f.

Keywords: Minnesota River, Mississippi River, St. Croix River, forecasting, water quality, biological data, chemical data, physical data.

15*. Federal Water Pollution Control Administration, 1966, Upper Mississippi River basin project study plan for a comprehensive water pollution control program.

Report Summary:

Keywords: Mississippi River, water quality, management plan.

16. Federal Water Pollution Control Administration, 1967, Proceedings of a conference in the matter of pollution of the interstate and intrastate waters of the upper Mississippi River and its tributaries - Minnesota and Wisconsin, Second session, February 28, March 1, and March 20, 1967: U.S. Department of the Interior, 3 volumes.

Report Summary: The purpose of the conference was to consider and evaluate the findings of the study about pollution of the upper Mississippi River initiated by the first conference in 1963.

Keywords: Mississippi River, Minnesota River, water quality.

17*. Federal Water Pollution Control Administration, 1967, A report on the immediate water pollution control needs of the upper Mississippi River main stem - Minnesota, Wisconsin, and Iowa.

Report Summary:

Keywords: Mississippi River, water quality, management plan.

18. Federal Water Pollution Control Administration, 1968, Proceedings of the progress evaluation meeting in the matter of pollution of the interstate and intrastate waters of the upper Mississippi River and its tributaries - Minnesota and Wisconsin, April 30, 1968: U.S. Department of the Interior, 324 p.

Report Summary: Includes some data for water quality in the Mississippi River in 1967.

Keywords: Mississippi River, Minnesota River, water quality.

19*. Federal Water Pollution Control Administration, 1969, Progress evaluation meeting (2nd) in the matter of the interstate and intrastate waters of the upper Mississippi River and its tributaries - States of Wisconsin and Minnesota: Held at Minneapolis, Minn., July 22, 1969: Washington, D.C., 362 p.

Report Summary: Included in the report are discussions, statements, and recommendations on: Federal installation's surface-water discharges, water standards for Minnesota, automatic monitoring program, and related subjects.

Keywords: Mississippi River, Minnesota River, water quality.

20*. Federal Water Quality Administration, 1966, A report on pollution of the upper Mississippi River and major tributaries.

Report Summary:

Keywords: Mississippi River, water quality.

21*. Federal Water Quality Administration, 1966, Summary and pollution abatement recommendations for the upper Mississippi River and major tributaries.

Report Summary:

Keywords: Mississippi River, water quality, management plan.

22*. Federal Water Quality Administration, 1969, Water supply and water quality control study, Minnesota River basin reservoirs, Minnesota-South Dakota-Iowa.

Report Summary:

Keywords: Minnesota River, water quality.

23. Fuller, S. L. H., 1978, Final report, freshwater mussels (mollusca: bivalva: unionidae) of the upper Mississippi River: Observations at selected sites within the 9-foot channel navigation project on behalf of the U.S. Army Corps of Engineers: The Academy of Natural Sciences of Philadelphia, Division of Limnology and Ecology, Report No. 78-33, 401 p.

Report Summary: A survey of freshwater mussel of the upper Mississippi River drainage was conducted during summer and autumn 1977. Over 8,000 living specimens were gathered and examined during surveillance of more than 40 actual or potential dredging sites in the Minnesota and St. Croix Rivers and in almost 20 upper Mississippi River pools. Historical and recent data were collected as complements to the Academy's 1977 information about upper Mississippi mussels. A history of the success or decline of each species-group mussel taxon is provided, plus notes on its ecology and nomenclature. An extensive bibliography is included.

Keywords: Mississippi River, Minnesota River, dredging, mussels, biologic data.

24. Ganoram, Inc., A Joint Venture, 1977, Combined sewer overflow study; interim report on available data and existing programs: Metropolitan Waste Control Commission, 148 p.

Report Summary: The report summarizes available information useful to a combined sewer overflow study. It has 213 annotated references about combined sewers, combined sewer overflow, treatment of combined sewer overflow, previous studies of sewerage systems in the Twin Cities area, and river water quality in the Twin Cities area.

Keywords: 201 study, bibliography, combined sewers.

25. Ganoram, Inc., A Joint Venture, 1978, Combined sewer overflow study; interim report on models selection, design criteria, and the alternatives analysis procedure: Metropolitan Waste Control Commission, 98 p.

Report Summary: The report gives a general overview of models available to simulate combined sewer overflow/runoff and receiving water conditions. The model selection procedure is outlined and applied, and the chosen models are described noting their individual characteristics especially applicable to this study. The models reviewed are SWMM, RIVER, AESOP, and SPAM.

Keywords: Mississippi River, combined sewers, computer models, 201 study, SWMM, RIVER, AESOP, SPAM.

26. Ganoram, Inc., A Joint Venture, 1978, Combined sewer overflow study; interim report on quantity and quality calibration/verification of the EPA SWMM runoff model: Metropolitan Waste Control Commission, 176 p.

Report Summary: This report describes the procedures followed to calibrate and verify SWMM for use in the combined sewer overflow study, and discusses the degree of success achieved. It also addresses the incidences of only limited successes and their associated causes.

Keywords: Combined sewers, computer models, 201 study, SWMM, computer modeling.

27. Ganoram, Inc., A Joint Venture, 1979, Combined sewer overflow study, interim report on waste allocations: Metropolitan Waste Control Commission, 76 p.

Report Summary: The extent to which the water-quality problems in the Mississippi River are caused by wet-weather flows in the Twin Cities metropolitan area was identified. The degree of combined sewer overflow control required to achieve recommended water-quality objectives is presented. The effects of chlorine toxicity resulting from disinfection of combined sewer overflows by chlorination are discussed.

Keywords: Mississippi River, combined sewers, water quality, 201 study, forecasting.

28. Ganoram, Inc., A Joint Venture, 1980, Combined sewer overflow study final report: Metropolitan Waste Control Commission, 127 p.

Report Summary: The report reviews previous studies of combined sewer overflow, describes the selection process for a plan to control combined sewer overflows, and presents the final plan.

Keywords: Combined sewers, management plan, 201 study.

29. Ganoram, Inc., A Joint Venture, 1980, Combined sewer overflow study; interim evaluation of system modeling results: Metropolitan Waste Control Commission, 333 p.

Report Summary: The report is a description of the calibration and verification of the SWMM model used to model the combined sewer system. The model results for various control and treatment alternatives of combined sewer overflow are presented as graphs of inflow and pollutographs.

Keywords: 201 study, Mississippi River, water quality, forecasting, combined sewers, SWMM, computer modeling.

30. GKY and Associates, Inc., 1980, An independent analysis of the modeling and assessment for Minneapolis and St. Paul's advanced waste treatment needs: U.S. Environmental Protection Agency, Implementation Branch, Water Planning Division, Washington, D.C., 38 p.

Report Summary: The report reviews the SWMM AESOP, SPAM, and RMA-12 computer models in context of their use as predictors of water quality in the Mississippi River in the Twin Cities area. The data base used to run the models is included as an appendix to "Review of water-quality modeling and stream data for the Mississippi River at Minneapolis-St. Paul, Minnesota," 1981, GKY and Associates, Inc.

Keywords: Mississippi River, computer models, computer modeling, SWMM, AESOP, SPAM, RMA-12.

31. GKY and Associates, Inc., 1981, Review of water-quality modeling and streams data for the Mississippi River at Minneapolis-St. Paul, Minnesota: U.S. Environmental Protection Agency, Region V, 91 p.

Report Summary: Data supplied by the Minnesota Pollution Control Agency was used to run an ammonia toxicity analysis in an attempt to quantify an ammonia effluent limit that will not violate the 0.04 mg/L unionized ammonia standard. A sensitivity analysis was conducted using the calibrated AESOP model under allocation conditions for the Twin Cities area.

Keywords: Mississippi River, water quality, forecasting, computer modeling, AESOP.

32. Great River Environmental Action Team (GREAT I), 1980, A study of the upper Mississippi River: 9 volumes.

Report Summary: The Great River Environmental Action Team (GREAT) is a working partnership of Federal agencies, states, and the public under the auspices of the Mississippi River Basin Commission. GREAT I was established in 1974 to study the upper Mississippi River from the Twin Cities to lock and dam 10 at Guttenberg, Iowa. The navigable parts of the Minnesota, St. Croix, and Black Rivers were included in the study area.

The primary objectives of the GREAT I study were the development of a detailed site-specific channel maintenance plan and recommendations for the management of the river system and its interrelated components within the river corridor. The final report consists of nine volumes; a main report and eight volumes of technical appendices. The 13 appendices included in the eight volumes are (1) flood-plain management, (2) dredged material uses, (3) dredging requirements, (4) material and equipment needs, (5) commercial transportation, (6) water quality, (7) sediment and erosion, (8) fish and wildlife, (9) recreation, (10) public participation, (11) plan formulation, (12) channel maintenance, and (13) environmental impact statement.

Keywords: Mississippi River, management plan, dredging, water quality, sediment.

33. Great River Environmental Action Team, 1980, Water-quality Work Group appendix to: A study of the upper Mississippi River: v. 4, app. F, 79 p.

Report Summary: The findings and recommendations of the work group to improve the water quality of the Mississippi River. Most of the recommendations are concerned with minimizing dredging impacts. The effects of dredging on water quality are summarized and past investigations into the effects of dredging are discussed. Bottom sediment size analysis, and nutrient, pesticide, and metal concentrations in bottom sediments are presented in two tables. The bottom sediments were sampled November 1974 at about 2-mile intervals from UM 618.6 to 855.0. An extensive bibliography on the effects of dredging on water quality is included.

Keywords: Mississippi River, water quality, bottom sediment, dredging.

34. Great River Environmental Action Team, 1980, Sediment and Erosion Work Group appendix to: A study of the upper Mississippi River: v. 4, app. G, 155 p.

Report Summary: The report covers sediment and erosion problems in Lake Pepin and pools 4 through 10 of the upper Mississippi River.

Keywords: Mississippi River, sediment.

35. Great River Environmental Action Team, Water Quality Work Group, 1978, A pilot study on effects of hydraulic dredging and disposal on water quality of the upper Mississippi River (July 1976): 38 p.

Report Summary: The pilot study to monitor the water-quality impacts of dredging and dredge spoil disposal was conducted at UM 827 immediately downstream of the Minneapolis-St Paul metropolitan area. Samples of undisturbed pre-dredge bulk sediments and post-dredge disposal plume water were examined for physical, chemical, and bacteriologic parameters during July 1976. Ambient fluctuations of the parameters in river water were found, in many cases, to be greater than impacts caused by dredging and disposal. Impacts were generally localized due to the sorptive capacity of rapidly settling resuspended sediment particles and dilutions. Most parameters, especially the suspended form of metals, showed a high positive correlation with suspended solids and other physical parameters.

Keywords: Mississippi River, dredging, water quality, pool 2.

36. Great River Environmental Action Team (GREAT I), Water Quality Work Group, 1979, Effects of clamshell (mechanical) dredging and disposal on water quality of the upper Mississippi River: 50 p.

Report Summary: Color and color infrared aerial photographs were synchronized with ground-based water sampling events to investigate the impacts of mechanical dredging and disposal on water quality. The study was conducted in pool 2 of the upper Mississippi River, July 1977. The aerial photographs were used in the preparation of turbidity maps of the dredging and disposal sites. Chemical and bacteriological analyses were conducted on surface and near-bottom water samples and correlated with resuspended sediments measured as turbidity and total suspended solids. Disposal activities were seen to have a greater impact on turbidity than dredging activities, but incidental barge passage past the study site proved to have even greater turbidity impacts than dredging or disposal. Data collected are presented in tables. There are four appendices. Two are cited separately (appendices 1 and 2). Appendices 3 and 4 are a correlation matrix for the chemical parameters sampled and miscellaneous data not used in the statistical analysis.

Data Types: 1a, 1c, 1d, 2, 3a, 3b, 5.

Keywords: Mississippi River, dredging, water quality, aerial photography, pool 2.

37. Grimes, D. J., 1977, Microbiological water-quality effects of hydraulically dredging polluted bottom sediments in the upper Mississippi River; I. Resuspension of bacteria: Great River Environmental Action Team, Water Quality Work Group.

Report Summary: The microbiological effects of hydraulically dredging polluted bottom sediments in the navigation channel of the Mississippi River were investigated at Grey Cloud Slough. Bottom sediments in the dredge cut area contained high densities of total coliforms (ca. 6,800 MPN total coliform index per gram dry weight and 3,800 membrane filter total coliforms per gram dry weight) and fecal coliforms comprised an average 32 percent of each total coliform count. Total coliform and fecal coliform densities in river samples taken immediately below the dredge discharge pipe were each approximately 4 times corresponding upstream values. Linear regression analyses indicated that mean turbidity values downstream to the dredging operation were directly and significatly ($r > 0.94$) related to corresponding total coliform, fecal coliform, and fecal streptococcus densities. Salmonellae and shigellae were not recovered from either upstream water samples or from downstream water samples. Within less than 1 mile below the dredge-spoil discharge area at the prevailing current velocity of ca. 0.15 m/sec, turbidity and indicator bacteria levels had returned to predredge levels. Recommendations were made that would protect downstream water users from the temporary health hazard associated with dredging polluted sediments.

Keywords: Mississippi River, dredging, bottom sediment, bacteria, pool 2.

38. Grimes, D. J., 1978, Microbiological water-quality effects of clamshell dredging bottom sediments from the upper Mississippi River: Great River Environmental Action Team, Water Quality Work Group, 34 p.

Report Summary: The microbiological effects of clamshell dredging Mississippi River bottom sediment suspected of being heavily contaminated with domestic and industrial wastes were investigated. Total coliform (TC), fecal coliform (FC), and fecal streptococcus (FS) densities were determined for sediment and water samples collected from above and below the clamshell dredge and above and below the discharge of dredged material. Salmonella and shigella detection techniques were also conducted on each sample. Results indicated that clamshell dredging had no significant effect (F test) on microbiological water quality as measured by TC, FC, FS, and FC/FS determinations. Salmonellae were detected in 7.1 percent of the upstream samples and in 16.7 percent of the downstream samples. However, data were presented to suggest a nondredge related origin for 15 (35 percent) of the Salmonella cultures. Some possibilities of why hydraulic dredging seems to have a greater effect on microbiological water quality than does clamshell dredging were discussed. The study was conducted in the Boulanger Bend Lower Light area of pool 2.

Keywords: Mississippi River, dredging, bacteria, pool 2.

39. City of Hibbing, Minn., 1981, Application for license for major project-existing dam for installation of hydroelectric facilities at Lock and Dam No. 2, Mississippi River, Hastings, Minn.

Report Summary: As part of this application, an environmental impact statement (EIS) is included. The EIS describes water quality and water use; fish, wildlife, and botanical resources; and land management among other items.

Keywords: Mississippi River, water quality, land use, environmental impact statement, Lock and Dam No. 2.

40. Eugene A. Hickok and Associates, 1972, Storm water impact investigation for the Metropolitan Council: Metropolitan Council of the Twin Cities Area, 124 p.

Report Summary: The general scope of the study was to review all existing information on storm water drainage, to catalog problems already identified and to identify data deficiencies. The specific scope of the project included the review of the reports and plans of all governmental units responsible for storm-water drainage.

Keywords: Water quality, storm runoff, literature review.

41. Eugene A. Hickok and Associates, 1978, Environment of the lower Minnesota River; southwest area 201: Metropolitan Waste Control Commission, 113 p.

Report Summary: The report presents a description of social, administrative, and environmental aspects of water quality and aquatic life in the lower Minnesota River from Jordan, Minn., to its confluence with the Mississippi River. Data is presented the form of short tables and figures on water-quality parameters, fish, macroinvertebrates, and algae.

Keywords: Minnesota River, water quality, 201 study.

42. Hickok-RCM International, 1974, Load allocation study for the lower Minnesota River segment for the Minnesota Pollution Control Agency: Minnesota Pollution Control Agency, 82 p.

Report Summary: The QUAL-II computer model was used to determine recommended effluent standards for discharges into the lower 35 miles of the Minnesota River for the years 1985 and 2000.

Keywords: Minnesota River, water quality, forecasting, computer modeling, QUAL-II.

43. Hughes, G. L., 1973, Unique and endangered plants and animals in the Twin Cities metropolitan area; Revised by Virginia Fuller Holman, June 1974: Metropolitan Council of the Twin Cities Area, 107 p.

Report Summary: The description, habitat, and classification of rare or endangered birds, plants, fishes, reptiles, and amphibians are given. A discussion of the history of the species in the metropolitan area and suggested management practices to preserve the species and the legal status of the species are also included.

Keywords: Metropolitan area, endangered species.

44. Hydroscience, Inc., 1977, Progress report on task I--Review of water-quality models: Metropolitan Waste Control Commission, 34 p.

Abstract: Past modeling and data collection efforts were reviewed with particular emphasis directed towards evaluating the extent to which existing information is appropriate for developing waste load allocations under summer low-flow conditions in the Twin Cities area of the upper Mississippi River, above Lock and Dam No. 2. The water-quality surveys of 1976 and 1977 were reviewed. The QUAL-II model revisions made for RMA-12 were reviewed. Algal-nutrient kinetics with respect to QUAL-II and RMA-12 were reviewed. Flow routing requirements in pool 2 were reviewed with respect to developing a model for the pool.

Keywords: Mississippi River, water quality, computer models, QUAL-II, RMA-12, pool 2.

45. Hydroscience, Inc., 1978, Upper Mississippi River 208 grant water-quality-modeling study summary report: Metropolitan Waste Control Commission, 26 p.

Report Summary: This summary report includes analysis of the major wastewater loads, description of the major components of the AESOP model framework, principal results of the water-quality model calibration and a preliminary projection using the water-quality model.

Keywords: Mississippi River, water quality, computer models, forecasting, 208 study, AESOP, computer modeling.

46. Hydroscience, Inc., 1979, Calibration report for the SPAM statistical model, Mississippi River at Minneapolis-St. Paul: Metropolitan Waste Control Commission, 242 p.

Report Summary: The objectives of the report are to (1) assess the water-quality impacts of wet-weather sources and identify areas in which storm-water runoff contributes to existing or project water-quality problems, (2) identify practical combined sewer overflow abatement strategies that can be used to alleviate those problems. Program documentation for the "Minneapolis-St. Paul Load Generator (MSPLG)" computer model is included as an appendix. The program documentation for the "SPAM" computer model is in a separately bound appendix to the report.

Keywords: Mississippi River, combined sewers, water quality, computer models, 201 study, computer modeling, SPAM, MSPLG.

47. Hydroscience, Inc., 1979, Upper Mississippi River 208 grant water quality modeling study, revised August 1979: Metropolitan Waste Control Commission, 126 p.

Report Summary: The report contains discussions of the upper Mississippi River water-quality data, analysis of the major wastewater loads to the Mississippi River, description of the components of the AESOP and RIVER computer models, and the results of the AESOP and RIVER water-quality-model calibration. Preliminary projections for the years 1978, 1985, and 2000 have been made using projected loads specified by the Metropolitan Waste Control Commission.

Keywords: 208 study, Mississippi River, computer models, water quality, computer modeling, AESOP, RIVER, forecasting.

48. Itasca Engineering, Inc., 1969, Water resource inventory of the lower Minnesota River watershed district: Lower Minnesota River Watershed District, 147 p.

Report Summary: The inventory includes a summary of pollution and siltation problems in the lower Minnesota River.

Keywords: Minnesota River, water quality, sediment.

49*. Johannes, C. A., 1960, Memorandum on Mississippi River in the metropolitan area from junction with Rum River to Minneapolis-St. Paul Sanitary District outfall, October 1960: Minnesota Department of Health, Division of Environment and Sanitation, Section of Water Pollution Control, mimeographed.

Report Summary:

Keywords: Mississippi River, water quality.

50. Johnson, J. H., 1976, Effects of tow traffic on the resuspension of sediments and on dissolved-oxygen concentrations in the Illinois and upper Mississippi Rivers under normal pool conditions: U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report Y-76-1, 181 p.

Abstract: The study was made to determine the effects of single and multiple tow traffic on the resuspension of riverbed sediments and on dissolved oxygen concentrations at several locations on the Illinois and upper Mississippi Rivers during normal pool conditions. There were three study sites on the Mississippi River from north of Winona, Minn. to above the confluence of the Mississippi and Illinois Rivers. Data are presented in the form of tables and figures.

Data types: 1a, 1c, 1d.

Keywords: Mississippi River, water quality, sediment, dissolved oxygen, navigation effects.

51. Kindschi, G. A., ed., 1980, A compendium of mollusk (naiad) surveys taken from the upper Mississippi River and major tributaries. U.S. Fish and Wildlife Service, Office of Endangered Species, Region 3, 268 p.

Report Summary: This compendium includes surveys that have been made since 1967 in the upper Mississippi River from UM 39.4 south of Cape Guadirau, Mo., to UM 857.6 at Twin Cities, Minn. Surveys of major tributaries such as the St. Croix, Minnesota, Illinois, and Yellow Rivers have been included.

Keywords: Data source inventory, mussels.

52. Larson, S. P., Mann, W. B., Steele, T. D., and Susag, R. H., 1976, Graphic and analytical methods for assessment of stream-water quality - Mississippi River in the Minneapolis-St. Paul metropolitan area: U.S. Geological Survey Water Resources Investigations 76-94, 55 p.

Report Summary: Historical records were analyzed to determine effects of population, pollution-control strategy and other factors on water quality of the Mississippi River. Isopleths of DO (dissolved oxygen) concentrations, and lines of equal stream temperature indicated periodic data could be used to guide sampling of certain critical conditions in time and space.

Long-term records revealed generally mixed changes in quality in the Mississippi River. Several mean-time series were used to show seasonal variation in water quality and effects of initiation of wastewater treatment in 1938. Kendall's tau statistical test indicated a significant increase in DO in the upper reach of the river during the period of record. If only the post-1938 period is considered, DO conditions remained fairly constant below the metropolitan plant and biochemical oxygen demand increased throughout the mainstem reach.

Significant trends in stream temperature were indicated for winter periods using Kendall's tau procedure. The Mann-Whitney statistical test gave estimates of a 98-percent confidence interval of the magnitudes of change.

Keywords: Mississippi River, water quality, historical data, statistical analysis.

53*. Lewis, R. C., 1970, The marginal costs of alternative levels of water quality in the upper Mississippi River: University of Minnesota Water Resources Research Center, M.S. Thesis, 59 p.

Report Summary: An analysis of the problem of waste disposal from the Twin Cities and its effect on the recreational and aesthetic use of the Mississippi River downstream.

Keywords: Mississippi River, water quality, economics.

54. Lyons, C. T., and Norton, W. R., 1972, Data report for the upper Mississippi River basin, prepared for the Environmental Protection Agency Systems Development Branch: Water Resources Engineers, August 1972, 48 p.

Abstract: The report describes the model structures of the modified version of QUAL-I used to model the upper Mississippi River. The report enumerates the sources and reliability of the data and identifies data weaknesses or deficiencies for application of the simulated model.

Keywords: Mississippi River, computer models, data source inventory, QUAL-I.

55*. Maier, W. J., McConnell, H. L., and Controy, L. E., 1974, A survey of organic carbon constituents in natural fresh waters: University of Minnesota Department of Civil and Mineral Engineering, Minneapolis; Office of Water Research and Technology, Washington, D.C., 12 p.

Report Summary: The paper describes the initial phase of a study of organic and inorganic carbon measurements in some of the major bodies of water in Minnesota. Concentration levels are described and discussed in terms of flow variation and seasonal changes. Information about sources and composition of organic materials are reviewed and discussed.

Keyword: Water quality.

56. Megard, R. O., 1976, An alternative for rates of production of planktonic algae in a river for use in QUAL-II: Metropolitan Waste Control Commission, 10 p.

Report Summary: The purpose of this memorandum is to show how the equations for algal production in the QUAL-II model may be written in a form that is probably more realistic and that contains only terms that can be evaluted with data obtained from natural populations. The revision involves assumptions about the biology of algal production that are fundamentally different from the assumptions in the original equation, but the mathematical form of the equation is not changed.

Keywords: Computer models, algae, QUAL-II.

57. Megard, R. O., Combs, W. S., Jr., and Settles, J. C., 1978, Planktonic algae, photosynthesis, and oxygen in the Mississippi River at Minneapolis and St. Paul, Minn: University of Minnesota, Department of Ecology and Behavioral Biology, Minneapolis, Minnesota, 54 p.

Report Summary: This is the final report for the Metropolitan Waste Control Commission. The relationshiops between population densities of algae and rates of oxygen production and consumption were investigated. The mechanisms that regulate the densities of planktonic algal populations were also analyzed. The chlorophyll concentrations used in the study were collected in late summer 1976 from the Mississippi River between Anoka and Hastings, Minn.

Keywords: Mississippi River, biologic data, algae, dissolved oxygen.

58. Metropolitan Area Advisory Committee, 1979, Final future conditions report for the Mississippi and Minnesota Rivers in the Twin Cities metropolitan area: Executive Director, Minnesota Pollution Control Agency, 114 p.

Report Summary: The report discusses probable future conditions for the Mississippi and Minnesota Rivers. The topics discussed are (1) physical characteristics, (2) adjoining land use, (3) instream users, (4) water quality, and (5) biological communities.

Keywords: Mississippi River, Minnesota River, forecasting.

59. Metropolitan Area Advisory Committee, 1979, Final present conditions report for the Mississippi and Minnesota Rivers in the Twin Cities metropolitan area: Executive Director Minnesota Pollution Control Agency, 79 p.

Report Summary: The report discusses in a general way the present condition of the Mississippi and Minnesota Rivers. The topics covered are (1) physical characteristics, (2) adjoining land use, (3) instream users, (4) water quality, (5) discharges, and (6) biological communities. No references are given.

Keywords: Mississippi River, Minnesota River.

60. Metropolitan Council of the Twin Cities Area, 1969a, Agencies and organizations concerned with the major river corridors in the Twin Cities metropolitan area; Appendix B of the major river corridor study: 250 p.

Report Summary: Over 200 Federal, State, local and private agencies and organizations are listed. A short description of purpose is given for each agency or organization. Any literature the agency or organization has published about one of the rivers in the metropolitan area are cited.

Keywords: Bibliography.

61*. Metropolitan Council of the Twin Cities Area, 1969b, Inventory of physical features and facilities within the major river corridors of the Twin Cities metropolitan area; Appendix A to the major river corridor study: 45 p.

Report Summary:

Keywords: Mississippi River, metropolitan area.

62. Metropolitan Council of the Twin Cities Area, 1970, Major river corridors report - draft for discussion purposes: 124 p.

Report Summary: The report is a pre-planning document intended to focus community attention on the three major rivers in the metropolitan area. It considers each river as a system composed of many different uses and constraints.

Keywords: Mississippi River, Minnesota River, St. Croix River, management plan.

63. Metropolitan Council of the Twin Cities Area, 1975, Water-quality management plan for the Twin Cities metropolitan area: Revised 1979, 708 p.

Report Summary: The report is intended to provide technical background material to be used in preparation of the Metropolitan Council's Development Guide and Policy Plan on water pollution control. It is a summary of many individual studies conducted since 1970. Its major sections are (1) a description of the physiography and climate, (2) population profile and projections of growth, (3) existing water-quality standards, (4) metropolitan waste treatment plants, (5) local sewerage systems, (6) on-lot disposal in the metropolitan area, (7) waste flows and storm-water discharges, (8) radiological wastes, (9) an examination of the metropolitan sewerage system by service area including problems, existing system, and future plans and alternatives, and (10) governmental responsibilities.

Keywords: Water quality, forecasting, management plan, Mississippi River, St. Croix River, Minnesota River.

64. Metropolitan Council of the Twin Cities Area, 1978, Assessment of water pollution from river dredging activities: 69 p.

Report Summary: This report reviews available information on current level of dredging activity, procedures in effect to mitigate adverse impacts from dredging and pollution potential from dredging and related activities.

Keywords: Water quality, dredging.

65. Metropolitan Council of the Twin Cities Area, 1978, Water pollution from urban runoff: 76 p.

Report Summary: This report summarizes the findings of the Metropolitan Council's study of potential water pollution from urban runoff in the metropolitan area. The purpose of the report was to assess the nature and extent of pollution from urban runoff and to provide a basis for determining whether further Metropolitan Council efforts were needed. This is one of nine studies conducted by the Metropolitan Council to assess the impacts of non-point pollution from different sources.

Keywords: Water quality, storm runoff.

66. Metropolitan Council of the Twin Cities Area, 1979, Water pollution from nonpoint-sources, an assessment and recommendations: 194 p.

Report Summary: The report provides an overview of problems resulting from nine categories of nonpoint-source pollution: agricultural runoff, stream channel erosion, urban stormwater runoff, construction erosion, landfill leachates, mining, barge washing, dredging, and miscellaneous nonpoint sources. This study relied solely on existing information and techniques about water quality for the numerical values that were used to estimate the magnitude of pollution from nonpoint sources.

Keywords: Water quality, storm runoff.

67. Metropolitan Council of the Twin Cities Area, 1981, Draft water-resources management development guide, Part 2. Surface-water management: Nonpoint-source pollution and stormwater runoff: Publication No. 62-81-025B, 121 p.

Report Summary: This is a draft document which when approved by the Metropolitan Council will become part 2 of the Council's Water-Resources Management Development Guide chapter. The document consists of five major sections: (1) a document summary, (2) the problem statement for surface-water management, (3) a plan that focuses on 43 secondary watersheds, (4) a management and financial program to implement the plan, (5) guidelines and procedures for watershed, priority lake, and local stormwater plan development. The study of surface-water runoff, finished in 1980 and conducted by the Metropolitan Council in conjunction with the U.S. Geological Survey, is summarized in short tables and graphs.

Keywords: Mississippi River, Minnesota River, water quality, storm runoff.

68**. Metropolitan Drainage Commission of Minneapolis and St. Paul, 1928, Second annual report, sewage disposal of Minneapolis, St. Paul, and contiguous areas: 127 p.

Report Summary:

Keywords: Mississippi River, water quality, historical data.

69. Metropolitan Waste Control Commission, 1975, Statement on state of Minnesota Pollution Control Agency proposed regulation WPL 18, hearing April 29, 1975: 22 p.

Abstract: This statement was not presented due to action by the Minnesota Pollution Control Agency to withdraw the proposed regulation. A load allocation study using the QUAL-II model was done. Validity of the model simulations is discussed.

Keywords: Mississippi River, forecasting, computer modeling, QUAL-II.

70*. Metropolitan Waste Control Commission, 1976, Combined sewer overflows: Final NPDES monitoring and sampling report for outfalls located in Minneapolis and St. Paul.

Report Summary: After some general comments, the narrative sequentially focuses on tables describing the measured combined sewer overflow frequency, duration, volume, the sampling results, storm water, and water quality.

Keywords: Mississippi River, combined sewers, chemical data, physical data, water quality.

71. Metropolitan Waste Control Commission, 1976, Development program 1977-1981: 215 p.

Report Summary: This is a development program for the 5 years from 1977 to 1981. The objectives of the development program are to plan and implement capital improvement projects necessary for the efficient and effective operations of the metropolitan disposal system in conveying and treating sewage in the metropolitan area.

Keywords: Forecasting, management plan, water quality.

72. Metropolitan Waste Control Commission, 1977, Baseline environmental inventory, Twin Cities metropolitan area: 426 p.

Report Summary: The inventory describes existing natural features, resources, and conditions in the metropolitan area. The sections of the report are: (1) climate, (2) topography, (3) geology and geomorphology, (4) soils, (5) hydrology, (6) wetlands, (7) plant associations, (8) animal populations, (9) sensitive areas, (10) energy, (11) water resources, (12) air quality, (13) land-water interface, (14) land use, (15) agriculture, (16) endangered and threatened plant and animal species, (17) pest species, (18) aesthetic, (19) educational, (20) scarce and unique features, (21) features of archaelogical, cultural, and historic interest, and (22) environmental constraints. Excellent lists of references.

Keywords: Mississippi River, Minnesota River, water quality, biologic survey.

73*. Metropolitan Council of the Twin Cities Area, 1978, Draft 208 areawide plan/development guide on water-quality management.

Report Summary: Overview on wastewater management including existing facilities within the metropolitan area and possible projections and alternatives.

Keywords: Metropolitan area, management plan, water quality.

74*. Metropolitan Council of the Twin Cities Area, 1978, Leachate generation potential from landfills in the Twin Cities metropolitan area.

Report Summary:

Keywords: Metropolitan area, water quality.

75. Metropolitan Waste Control Commission, 1980, Environmental impact statement: 201 Summary Report Series, v. 9, 35 p.

Report Summary: The summary was written for the August 14, 1980, 201 Facilities Plan Public Hearing. It only covers combined sewer overflow and residual solids management plans.

Keywords. Management plan, water quality, 201 study, environmental impact statement.

76*. Midwest Research Institute, North Star Research Division, 1976, Water pollution Control Act of 1972, Environmental impact assessment, upper Mississippi River basin: National Commission on Water Quality, Washington, D.C., 341 p.

Report Summary: A comprehensive environmental impact assessment at the Mississippi-Minnesota-St. Croix confluence was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). Authors (1) characterized historical and existing environmental conditons and (2) projected biological, ecological, and environmental change, impacts, and benefits, assuming specific reductions in point-source effluent loadings and resultant water quality within the site. This site assessment is one of 41 similar studies conducted for the Environmental Sciences sector of the National Commission on Water Quality.

Keywords: Mississippi River, Minnesota River, St. Croix River, water quality, forecasting, environmental impact assessment.

77*. Minnesota Department of Health, 1928, Report of the investigations of pollution of the Mississippi River, Minneapolis-St. Paul to LaCrosse.

Report Summary:

Keywords: Mississippi River, water quality, historical data.

78**. Minnesota Department of Health, 1933, Report of special investigation of the pollution of the Mississippi River, May and June, 1933.

Report Summary:

Keywords: Mississippi River, water quality, historical data.

79*. Minnesota Department of Health, 1964, Lower Minnesota River study.

Report Summary:

Keywords: Minnesota River, water quality.

80*. Minnesota Department of Conservation, Division of Game and Fish, 1964, Game and fish values of the Mississippi River between the Rum River at Anoka and the Chippewa River below Lake Pepin: mimeographed.

Report Summary:

Keywords: Mississippi River, fish.

81. Minnesota Department of Natural Resources, 1974, Inventory of state water and related land-resources information systems: October 1974, 226 p.

Report Summary: Survey information from 48 state governmental and academic units are presented in the report. The information was collected in 1974. The bibliographic information is presented by data type. The organization name, contact persons, and a description of the data is given for each citation.

Keywords: Data source inventory.

82. Minnesota Outdoor Recreation Resources Commission, 1965, The Minesota River valley: 82 p.

Report Summary: The report is a summary of land and water use in the Minnesota River valley prepared for state legislatures. The report is general and of little value, except that it lists all Corps of Engineers reports, other studies, flood and navigation projects, watershed districts, and agencies with jurisdiction in the Minnesota River valley up to 1964.

Keywords: Minnesota River, bibliography.

83**. Minnesota Pollution Control Agency, 1968, Memorandum on the waste assimilation capacity of the lower 30 miles of the Minnesota River.

Report Summary:

Keywords: Minnesota River, water quality.

84. Minnesota Pollution Control Agency, Division of Water Quality, 1969, Memorandum on the waste assimilation capacity of the Mississippi River in the Twin Cities metropolitan area: 57 p.

Report Summary: The study was made to determine the assimilative capacity of the Mississippi River in connection with application to build a sewage treatment plant in Fridley that would discharge to the river. The study includes the river from Fridley to Lock and Dam No. 2. Dissolved oxygen levels in the river were forecast for various effluent loading scenarios for the years 1985 and 2000.

Keywords: Mississippi River, water quality, forecasting, dissolved oxygen.

85**. Minnesota Pollution Control Agency, 1972a, Memorandum on the water quality of the Mississippi River in the vicinity of Minneapolis-St. Paul metropolitan plant discharge, June 5-9, 1972: Mimeographed.

Report Summary:

Keywords: Mississippi River, water quality.

86**. Minnesota Pollution Control Agency, 1972b, Memorandum on survey of polychlorinated biphenyls in waters of the Twin Cities metropolitan area.

Report Summary:

Keywords: Mississippi River, water quality, PCB's.

87. Minnesota Pollution Control Agency, Division of Water Quality, 1975, Load allocation study - Minneapolis-St. Paul metropolitan Mississippi water-quality segment: 33 p.

Report Summary: Load allocations for all discharges were developed for present conditions (1975), 1985, and 2000. The QUAL-II model was used for the waste load allocation study.

Keywords: Mississippi River, water quality, forecasting, computer modeling, QUAL-II.

88. Minnesota Pollution Control Agency, 1976, Draft water-quality task group technical report for the Minneapolis-St. Paul metropolitan area level B study: Upper Mississippi River Basin Commission, Water Quality Task Group, 108 p.

Report Summary: Two water-quality problems in the Minneapolis-St. Paul metropolitan area were investigated as Level B study problems focuses: (1) water quality in pool No. 2 of the Mississippi River, and (2) nonpoint-source pollution of metropolitan area lakes. Existing water-quality point discharges, and nonpoint sources of pollution are described and discussed. The QUAL-II model was used to evaluate various treatment practices for the discharges to the metropolitan Mississippi River reach.

Keywords: Mississippi River, water quality, forecasting, pool 2, computer modeling, QUAL-II.

89. Minnesota Pollution Control Agency, 1977, A comparison of the water-quality behavior of the Minnesota River, August 19-24, 1974, with predictions of the stream-water-quality model, QUAL-II: 77 p.

Abstract: The QUAL-II model was calibrated for the lower Minnesota River using data collected in 1965 and 1970. The data collected during the low-flow period of the Minnesota River was used to verify the model. The report concludes that the model can accurately predict seven parameters (temperature, dissolved oxygen, five-day biochemical oxygen demand, Kjeldahl nitrogen, nitrite nitrogen, nitrate nitrogen, orthophosphate). It cannot predict chlorophyll a accurately. The report includes as appendices the data used to verify the model. Time of travel study data is included. The 1974 data report of the Minnesota River survey, August 19-24, 1974, by the Metropolitan Waste Control Commission is included as an appendix.

Data Types: 1a, 1b, 1c, 1d, 2, 3a, 3b, 4a, 4b, 8, 9.

Keywords: Minnesota River, computer modeling, water quality, biologic data, chemical data, physical data, QUAL-II.

90. Minnesota Pollution Control Agency, 1981, Ammonia effluent limitation for the metropolitan wastewater treatment plant—Minneapolis-St. Paul, Minnesota; A part of the Mississippi River waste load allocation study: 32 p.

Report Summary: The process for selecting recommended effluent ammonia limitations for the metropolitan treatment plant (Pig's Eye) is described. A discussion of the possibility of changing the recommended ammonia limits because of changing future conditions in the river is included along with a brief sensitivity analysis of the assumptions used in determining the effluent limitations.

Keywords: Mississippi River, water quality, forecasting, Pig's Eye plant.

91. Minnesota Pollution Control Agency, Division of Water Quality, 1981, Biological monitoring program, Minnesota streams; An assessment of biological data for 1977, 1978, and 1979: 88 p.

Report Summary: Biological monitoring has been carried out by the Minnesota Pollution Control Agency since fall 1976. Twenty-one stations in nine of the State's eleven basins were monitored with artificial substrates from 1977-79. The benthic macroinvertebrate samples from 1977, 1978, and 1979 were statistically assessed using the Shannon-Weaver diversity index, equitability calculations, and relative abundance comparisons. These samples were also assessed from a qualitative standpoint; i.e., ordering and listing of the six dominant taxa found at each stations. The benthic data were then used to assess water quality at each station. The water chemistry data for dissolved oxygen (DO) and five-day biochemical oxygen demand (BOD_5) concentrations, and flow were also used in the assessment of water quality.

The benthic data indicate that macroinvertebrate diversity and equitability increased and organism relative abundance decreased at most stations during 1978 and 1979 in contrast to 1977. These quantitative changes were also accompanied by shifts in the kinds of organisms found to a less tolerant fauna at many of the stations in 1978 and 1979. These changes in the benthic fauna corresponded to the high flows of those 2 years. Flows during 1977 were below average. Decreases in BOD_5 concentrations were also observed at many stations during 1978 and 1979.

Data Type: 6b.

Keywords: Mississippi River, Minnesota River, St. Croix River, water quality, macroinvertebrate data.

92. Minnesota Pollution Control Agency, 1981, Mississippi River waste load allocation study—Minneapolis-St. Paul, Minnesota: 147 p.

Report Summary: The water-quality model AESOP was used to determine effluent limitations for BOD and effluent dissolved oxygen for the metropolitan waste treatment plant (Pig's Eye). The report details the model calibration and verification; and gives model projections for the year 2000. A sensitivity analysis was performed.

Keywords: Mississippi River, water quality, forecasting, computer modeling, Pig's Eye plant, AESOP.

93. Minnesota State Planning Agency, Environmental Planning Division, 1977, Inventory of aerial photography and other remotely sensed imagery of Minnesota: 99 p.

Report Summary: This report lists the Federal, State, and county agencies that have aerial photographs or other remote sensing data of Minnesota. The area of coverage, the type of imagery, where the images can be viewed, and where the images can be purchased are listed.

Keywords: Data-source inventory, aerial photography.

94. Minnesota State Planning Agency, Land Management Information Center, 1981, Catalog of water-data sources in Minnesota; SWIM, Systems for Water-Information Management: 50 p.

Report Summary: This bibliography briefly describes 80 data bases maintained by nine State agencies. The data bases all deal with some aspect of water use, water quality, and (or) water quantity in the State of Minnesota. Both surface-water and ground-water data bases are included.

Keywords: Water quality, water quantity, water use, bibliography.

95. Minnesota Water Pollution Control Commission, no date, Report on investigations of the Mississippi River from the mouth of the Rum River to the mouth of the St. Croix River, July and August 1960 and August and September 1961: Minnesota Department of Health.

Report Summary: The investigations were undertaken to obtain information to provide a basis for possible classification and adoption of standards for the Mississippi River in this area. The report includes a history of previous investigations conducted by the Minnesota Department of Health of the water quality in the river in 1928, 1933, 1951-52, 1956, and 1958. Data are presented in tables and graphs.

Data Types: 1a, 1c, 1d, 2, 3a, 3b, 4a, 4b.

Keywords: Mississippi River, water quality, biologic data, chemical data, physical data, historical data.

96. Minnesota Water Pollution Control Commission, no date, Report on investigation of the lower Minnesota River and tributaries from Carver Rapids to the mouth, August 1963 to February 1964: Minnesota Department of Health, 164 p.

Report Summary: Three separate field surveys were made during August, October, and November 1963, and in early February 1964 on the lower Minnesota River and tributaries from Carver Rapids south of Carver to the confluence with the Mississippi. Physical observations, collection of water samples for bacteriological and chemical analysis, and collection of bottom samples for determination and examination of bottom fauna and flora were made. The data are included in the form of tables.

Data Types: 1a, 1c, 1d, 2, 3a, 3b, 4, 5.

Keywords: Minnesota River, chemical data, physical data, historical data.

97*. Minnesota Water Pollution Control Commission, 1964, Summary report on the pollution status of the Mississippi River and major tributaries from the mouth of the Rum River to the outlet of Lake Pepin: Minnesota Department of Health, 57 p.

Keywords: Mississippi River, water quality.

98. Minnesota Water Resources Council, 1975, Water information systems catalog: MWRC-1, 197 p.

Report Summary: This catalog is a compilation of inventories of water and related land-resources-information systems used by State agencies, selected colleges, and the University of Minnesota. The catalog lists information systems by organization. In another section the organization, information types, methodology of collection, use, and analysis are cross-tabulated. An index by information type is provided. Detailed descriptions of the information systems used are given, including examples of the printed forms used by the systems. Forty state government units, eight outstate academic institutions, and the University of Minnesota are included.

Keywords: Data-source inventory.

99*. Minnesota-Wisconsin PCB Interagency Task Force, 1975, Preliminary report on the polychlorinated biphenyls in the Mississippi River and Lake Pepin: 13 p.

Report Summary: The PCB task Force has initiated a field sampling program that is being conducted on the Mississippi River and its major tributaries from Elk River, Minn. to Alma, Wis. The program covers surface-water sampling, bottom-sediment sampling, point-source discharge sampling, air-quality sampling, and fish-flesh sampling.

Keywords: PCB's, Mississippi River, water quality.

100*. Minnesota-Wisconsin PCB Interagency Task Force, 1976, Polychlorinated biphenyls (PCB's) in the upper Mississippi River basin: 55 p.

Report Summary: The primary objectives of the Task Force were to identify the source or sources of PCB's to the Mississippi River and to determine the extent of the pollution problem so that PCB contamination controls could be recommended. The Task Force initiated a field sampling program on the Mississippi River and its tributaries that included surface-water sampling, bottom-sediment sampling, sanitary landfill monitoring, well-water sampling, industrial effluent sampling, municipal wastewater treatment plant effluent and sludge sampling, and fish-flesh sampling. This report presents all data obtained by the Task Force (including the August 1975 Task Force preliminary report and the November 12, 1975, Minnesota Pollution Control Agency PCB report), and the conclusions and recommendations of the Task Force based on those data.

Keywords: PCB's, Mississippi River, water quality.

101*. Moyle, J. B., 1940, A biological survey of the upper Mississippi River system: Minnesota Department of Conservation Fisheries Reserach Unit, Investigative Report No. 237.

Report Summary:

Keywords: Mississippi River, biologic survey.

102. NALCO Environmental Sciences, 1978, Report to U.S. Army Corps of Engineers Rock Island District, Rock Island, Illinois—Fish and Wildlife Management Work Group literature, GREAT River Study: 600 p.

Report Summary: This is a very extensive annotated bibliography of reports and data, published and unpublished, relating to the fish and wildlife of the Mississippi River upstream of its confluence with the Ohio River. The bibliography is divided into two parts: (1) an annotated bibliography, and (2) a keyword thesauraus. The annotated bibliography section is subdivided into two sections: (1) an alphabetical listing of all entries authored by individual, and (2) an alphabetical listing of all entries authored by State and Federal agencies, organizations, companies, universities and colleges, and (or) other groups (including those entries listed as anonymous). The keyword section is subdivided into three sections: (1) biological keywords, (2) geographical keywords, and (3) physical-chemical keywords.

Keywords: Bibliography, Mississippi River, data-source inventory.

103. National Biocentric, Inc., 1979, A baseline inventory of the aquatic community in the Mississippi River: Metropolitan Waste Control Commission, 203 p.

Report Summary: The objective of this study was to establish a base of ecological information for the Mississippi River. The survey was designed so that the information collected will provide a data base for future assessments of the impacts of combined sewer overflow alternatives to be developed as part of the 201 facilities planning effort. Quantitative data were collected to describe the macroinvertebrate, periphyton, and fish populations in each of the basic habitats commonly found in this region of the river. Sites were selected to represent the basic habitats above, within, and below the area anticipated to be affected by combined sewer overflow alternatives. The data collected are presented in the report.

Data Types: 1b, 1e, 6

Keywords: 201 study, Mississippi River, combined sewers, biologic data, biologic survey.

104*. Neely, W. B., Blau, G. E., and Alfrey, T., 1976, Mathematical models predict concentration-time profiles resulting from chemical spill in river: Environmental Science Technology, v. 10, p. 72-76.

Report Summary: With the increased use of the nation's waterways for the transportation of materials, there is an increase in the probability of spills. Once such a spill has occurred, there is an immediate need to predict the concentration profile of the chemical as the spill travels in order to assess the impact to both humans and the environemnt. The paper discusses the use of a mathematical model that has this predictive capability for common spills. Although the model is derived from the assumption that the chemicals are completely water soluble, it is also useful for partly soluble materials. The credibility of the model is demonstrated by comparing the concentration profile predicted with the actual profiles measured in two different incidents.

Keywords: Computer models.

105*. Norrgard, R., and Wallace, K., 1979, Minnesota valley wildlife refuge/recreation area resource catalog: Minnesota Department of Natural Resources, Minnesota River valley project, 393 p.

Report Summary: The catalog was compiled to assist planners and researchers in identifying source materials relevant to the preparation of a comprehensive master plan for the Minnesota Valley National Wildlife Refuge/Recreation Area. The catalog is divided into two major sections; natural resources and human resources and infrastructure. The following categories are under natural resources: (1) general, (2) water resources, (3) wildlife, (4) soils, (5) geology, (6) vegetation, and (7) climate. The following categories are under human resources and infrastructure: (1) historical, (2) environmental education, (3) recreation, (4) special populations, (5) demographic data, (6) energy, (7) transportation, (8) utilities, (9) land use, (10) economics and development, (11) jurisdictional boundaries, and (12) Twin Cities metropolitan area overview. As an appendix to the catalog is the report:

Metropolitan Council of the Twin Cities Area, 1978, Directory of planning resources, local planning assistance; publications and agencies providing local planning information and assistance: 88 p.

Each citation has been entered onto a page-size form. On the form is a map of the Minnesota River valley where the specific geographic area of interest can be marked, if there is one. There are 10 categories on the form that can be filled in to indicate; source format, map scale, date of source, cost of acquisition, where available, keywords, availability of technical assistance, contact person, and a one-sentence comment on the information source.

Keywords: Bibliography, Minnesota River.

106. North Star Research Institute, 1973, Environmental impact assessment of the northern section of the upper Mississippi River, Minneapolis: Prepared for the U.S. Army Corps of Engineers, St. Paul District, 14 volumes.

Report Summary: The purpose of the study was to assess the environmental impact of all the Corps of Engineers' facilities and operations on the Mississippi River from the head of navigation in Minneapolis to Guttenberg, Iowa. Also included in the study were the navigable parts of the St. Croix and Minnesota Rivers. St. Anthony Falls upper and lower pools, pool 1, pool 2, and the navigable part of the Minnesota River are each discussed in separate volumes.

Keywords: Mississippi River, Minnesota River, environmental assessment.

107. Northern States Power Company, 316(a) and 316(b) reports.

Report Summary: Northern States Power Company has done what are called 316(a) and 316(b) studies of its power plants. The studies are done to demonstrate that the cooling-water intakes for their plants reflect the best available technology for minimizing environmental impacts, particularly the impact on fish. They contain considerable information about fish in the rivers and present river conditions that might adversely affect fish. The data is from other sources. 316(b) studies have been done for the Black Dog, High Bridge, and Riverside steam-generating plants.

Keywords: Minnesota River, Mississippi River, water quality, environmental assessment.

108. Norton, W. R., 1974a, Final report for the upper Mississippi River basin model project: U.S. Environmental Protection Agency Water Planning Division, Planning Assistance Branch, 269 p.

Report Summary: The report summarizes the earlier reports prepared in accordance with the contract between Water Resources Engineers and the Environmental Protection Agency to develop a water-quality model for the upper Mississippi River basin, QUAL-II. The report summarizes the relevant water-qaulity data in the upper Mississippi River basin and outlines the calibration, validation, and sensitivity of QUAL-II for the three major rivers in the basin, the Mississippi, the Minnesota, and the St. Croix. The data base for the upper Mississippi River basin, including hydrology, water quality, and climatology is summarized.

Keywords: Mississippi River, computer modeling, data-source inventory, QUAL-II.

109**. Norton, W. R., 1974b, Model validation and sensitivity analysis for the upper Mississippi River basin: Water Resources Engineers.

Report Summary:

Keywords: Mississippi River, water quality, computer modeling.

110**. Norton, W. R., 1974c, Report on the water quality behavior of the upper Mississippi River, August 14-23, 1973: Water Resources Engineers.

Report Summary:

Keywords: Mississippi River, water quality

111**. Norton, W. R., 1974d, Supplemental simulations for the Upper Mississippi River basin, 1964-1965: Water Resources Engineers.

Report Summary:

Keywords: Mississippi River, water quality, computer modeling.

112. Norvitch, R. F., Ross, T. G., and Brietkrietz, Alex, 1973, Water-resources outlook for the Minneapolis-St. Paul metropolitan area, Minnesota: Metropolitan Council of the Twin Cities area, 219 p.

Report Summary: The water resources were studied within an area whose natural ground-water flow is largely toward the center of the metropolitan area. This area coincides with the extent of the Hinckley Sandstone aquifer. Thus, the general geohydrology of the area bounded by the extent of the Hinckley Sandstone (about 6,000 square miles) as it relates to the hydrology of the Minneapolis-St. Paul metropolitan area is described. Greater emphasis is placed on the area underlain by the Prairie du Chien-Jordan aquifer (about 2,000 square miles), from which approximately 75 percent of the ground water for the metropolitan area is pumped.

The study indicates that the surface-water resources of the Twin Cities metropolitan area are used to such an extent that a supply adequate for domestic and industrial needs as well as power plant and sanitary effluent assimilation will not be available during severe drought.

Ground water is obtained primarily from two aquifer systems: the Prairie du Chien-Jordan and the Mount Simon-Hinckley. In 1970, the aquifers supplied about 90 percent (175 mgd) of the ground water used in the metropolitan part of the study area. The probable level of development that can be sustained by these two aquifers in the metropolitan area is estimated to be 1,100 mgd; thus, substantial additional ground-water supplies could be developed. However, considerable management and planning would be needed to sustain this level of development.

Keywords: Metropolitan area, water use, water quantity.

113. Olson, K. N., and Meyer, M. P., 1976, Assessment of upper Mississippi River flood-plain changes with sequential aerial photography: Photographic Engr. and Remote Sensing, v. 42, p. 829.

Report Summary: This project, sponsored by the Environmental branch of the U.S. Army Corps of Engineers, St. Paul District, was designated to determine the type and extent of long-term natural and man-made changes in flood-plain features in the Mississippi River valley between Minneapolis-St. Paul, Minn., and Guttenberg, Iowa. Twice in 1973 (i.e., spring flood stage and late summer lower water stages, respectively), the study area received 9 x 9-inch format metric camera B & W Aero Infrared Type 2424/Wratten 25 filter photographic coverage at a scale of 1:24,000. This film/filter combination was selected to accentuate water and moisture boundaries to a maximum. Detailed 1:6,000 scale maps were prepared from these 1973 photographs to serve as a baseline against which to compare changes in such features as channels, backwaters, vegetation, and the amount, location, and conditions of dredge spoil. These 1973 baseline maps were then compared with conditions portrayed on the 1939 AAA and ASCS 1:20,000 scale panchromatic photographs of the area (supplemented by analysis of interim maps, inverviews of long-timer river residents, etc.). The results of these comparisons and the apprarent changes in the river flood-plain over the period 1939-1973 are summarized.

Keywords: Mississippi River, aerial photography, land use, navigation effects, historical data.

114. Olson, K. N., and Meyer, M. P., 1976, Vegetation, land and water-surface changes in the upper navigable portion of the Mississippi River basin over the period 1939-1973: University of Minnesota Institute of Agriculture, Forestry and Home Economics Remote Sensing Laboratory Report No. 76-4, 225 p.

Report Summary: This study was done for the U.S. Army Corps of Engineers, St. Paul District. The study had three objectives: (1) to prepare a 1973 baseline vegetation, land, and water-surface map from the heads of navigation to the Mississippi, Minnesota, and St. Croix Rivers to Guttenberg, Iowa; (2) chart the post-1938 vegetation land and water-surface changes in pools 5 through 10 and in the Minnesota River from the head of navigation downstream and assess their relationship to man-caused changes in the drainage basin during the period 1939-1973.

Keywords: Mississippi River, Minnesota River, navigation effects, historical data, land use, aerial photography.

115*. Owen, R., 1952, Memorandum on a survey of the Mississippi River from above the Minneapolis water works intake to below Minneapolis at the Ford Dam, December 17, 1951 to January 17, 1952: Minnesota Department of Health, Division of Water Pollution Control, mimeographed.

Report Summary:

Keywords: Mississippi River, fish survey.

116. Paily, P. P., Su, T. Y., Giaquinta, A. R., and Kennedy, J. F., 1976, The thermal regimes of the upper Mississippi and Missouri Rivers: University of Iowa Institute of Hydraulic Research, Iowa City, Iowa, Report No. 182, 407 p.

Report Summary: This report was sponsored by the Mid-Continent Area Power Pool, Minneapolis. Its purpose was to study the remaining capacity of the upper Missouri and Mississippi Rivers for thermal loadings from electric power plants. It contains two parts: (1) transient and steady-state computational models for the prediction of river thermal regimes, and (2) analysis of thermal regimes of the Mississippi and Missouri Rivers in the Mid-Continent Area Power Pool (MAPP) geographical area.

Keywords: Mississippi River, thermal effluent study, computer modeling.

117. Peddicord, R., Tatem, H., Gibson, A., and Pedron, S., 1980, Biological assessment of upper Mississippi River sediments: U.S. Army Corps of Engineers Waterways Experimental Station, Vicksburg, Miss., Miscellaneous Paper EL-80-5, 82 p.

Report Summary: The objective of this study was to determine the potential for polychlorinated biphenyls (PCB) and metals to bioaccumulate in the tissues of fish and invertebrates as a result of exposure to sediment from various dredging sites in the upper Mississippi River area. The acute toxicity of these sediments was of secondary interest. Sediments taken from just below the metropolitan waste treatement plant, Lake Pepin, Lake Polander, and the Minnesota River were used. This study provided little indication that typical dredging and disposal operations on the upper Mississippi have a potential to cause ecologically meaningful increases in mortality or bioaccumulation in the species studied.

Keywords: Mississippi River, sediment, dredging, water quality, PCB's, metals.

118. Peterson, D. E., and Jaske, R. T., 1970, Potential thermal effects of an expanding power industry: Upper Mississippi River basin: AEC Research and Development Report prepared by Battelle Memorial Institute Pacific Northwest Laboratories, 94 p.

Report Summary: Direct cooling capacities of the mainstem Mississippi River and eight major tributaries between Royalton, Minn. and Alton, Ill. for average and low-flow conditions were simulated within a temperature constraint of $5^{o}F$ above natural background. Analyses of projected power growth patterns indicate that the main stem has adequate cooling capacity to accomodate forecasted loads through the year 1990 except in the St. Paul-Minneapolis area. Partial recirculatory cooling facilities appear to be a possible solution to tributary cooling water requirements beyond the year 1980.

Keywords: Mississippi River, water quality, forecasting, thermal effluent study.

119. Putnam, R. D., 1975, Trace metal emmissions from wastewater treatment plant: Doctoral thesis, University of Minnesota, Minneapolis, 101 p.

Report Summary: A study was undertaken to detemine the stack emmissions of eight trace metals from sludge incinerated at the Pig's Eye wastewater treatment plant and to determine the levels of these metals in the vicinity of the plant. An inventory balance of the eight metals entering the plant, their distribution during treatment process and the route by which they were re-introduced into the environment was conducted. The metals investigated were cadmium, chromium, copper, iron, manganese, nickel, lead, and zinc.

Keywords: Pig's Eye waste treatment plant, water quality, Mississippi River, metals.

120. Rademacher, J. M., 1964, Report on pollution of the waters of the upper Mississippi River and its significant tributaries, Minneapolis-St. Paul metropolitan area, Minnesota-Wisconsin: U.S. Department of Health, Education, and Welfare, Public Health Service, Division of Water Supply and Pollution Control, Region V, Chicago, 68 p.

Report Summary: The purpose of the report, which was based on available data obtained from state and local groups, was to examine and report on the uses made of the Mississippi River in the metropolitan area and on the existing sources of pollution. The part of the Mississippi studied was from Rum River to the Lake Pepin outlet. The Minnesota and St. Croix Riverrs were included because of their possible influence on Mississippi River quality.

Keywords: Mississippi River, water quality.

121*. Reinhard, E. G., 1930, The plankton ecology of the upper Mississippi (Minneapolis to Winona): University of Minnesota, Minneapolis, Ph.D. thesis.

Report Summary:

Keywords: Mississippi River, water quality, algae.

122*. Reinhard, E. G., 1931, The plankton ecology of the upper Mississippi, Minneapolis to Winona: Ecol. Mongr., v. 1, no. 4, p. 395-464.

Report Summary: The chief purposes of this paper are to present a general picture of the plankton of the upper Mississippi, the relative abundance and seasonal distribution of the constituent organisms, the ecological factors that operate to influence the normal routine of plankton life, and the elucidation as far as possible by qualitative, quantitative, and statistical methods of some of the basic principles that underlie the amazing and complex phenomena exhibited by the plankton of a typical though polluted stream.

Keywords: Mississippi River, algae, water quality.

123. Resource and Community Development Interdisciplinary Seminar of 1981, 1981, Urban impacts on the Minnesota River Valley National Wildlife Refuge: University of Minnesota, 113 p.

Report Summary: This report consists of three reports that are the end product of the Resources and Community Development Interdisciplinary Seminar of 1981. The first report is on recreational opportunities in the Refuge, the second is on community development around the Refuge, and the third is on the effect of water quality of the Minnesota River on the Refuge.

Keywords: Minnesota River, wildlife, management plan.

124. Scherz, J. P., and Teppen, T., 1979, Analyzing river turbidity plumes with aerial photos: Appendix 2 to Effects of clamshell (mechanical) dredging and disposal on water quality of the upper Mississippi River: Great River Environmental Action Team (GREAT I), Water Quality Work Group, 19 p.

Report Summary: The report describes the procedures used to measure turbidity with aerial photographs and the theory on which the measurements were made. Graphs of turbidity increase from barges are included.

Keywords: Mississippi River, dredging, water quality, aerial photography.

125. Schroepfer, G. J., and others, 1958, Pollution and recovery characteristics of the Mississippi River in three parts, Volume 1, Part 1—An analysis of available data for the period 1926-1955: University of Minnesota Department of Civil Engineering, Sanitary Engineering Report 110-S, 217 p.

Report Summary: This report was sponsored by the Minneapolis-St. Paul Sanitary District. The specific characteristics of the river discussed in the report are (1) deoxygenation and aeration characteristics, (2) frequency of occurrence of critical dissolved oxygen, (3) diurnal variations of dissolved oxygen, and (4) bacteriological quality. In addition the following topics are discussed: (1) river flow times, (2) temperature conditions, (3) aeration of river dams, and (4) deoxygenation rates. Data and statistical analysis of the data are presented for (1) biochemical oxygen demand, (2) dissolved oxygen, (3) diurnal variations of dissolved oxygen, and (4) fecal coliform.

Data Types: 1a, 1b, 3a, 3b, 7a, 7b, 9.

Keywords: Mississippi River, water quality, statistical analysis, physical data, chemical data, historical data.

126. Schroepfer, G. J., Susag, R. H., and others, 1961, Pollution and recovery characteristics of the Mississippi River, Volume 1, Part 3: Minneapolis-St. Paul Sanitary District: University of Minnesota Department of Civil Engineering, 302 p.

Report Summary: The project was conducted by the Sanitary Engineering Division of the Department of Civil Engineering, University of Minnesota. This report is part of the same series as the earlier report by Schroepfer, "Pollution and recovery characteristics of the Mississippi River, Volume 1, Part 1, 1926-1953." Data and statistical analysis of the data are presented for the following river characteristics: (1) flow, (2) dissolved oxygen and biochemical oxygen demand variations, (3) flow times and water-surface areas, (4) temperature, (5) organic bottom deposits, (6) algae, and (7) the validity of the data. The capacity of the river for thermal and waste additions is investigated. Deoxygenation and reaeration data presented in volume 1, part 1 are extended and reevaluated. Sample temperature and dissolved oxygen models are developed and used for some load allocation studies and projections of future dissolved oxygen conditions. This work is a summary of material contained in the following Sanitary Engineering Progress Reports:

No.	Date
113-S	January 1, 1958
116-S	April 1, 1958
118-S	July 1, 1958
121-S	October 1, 1958
124-S	January 1, 1959
128-S	July 1, 1959
131-S	October 1, 1960
136-S	April 1, 1961
141-S	January 1, 1961
142-S	July 1, 1961
143-S	August 15, 1961

Data Types: 1a, 1b, 3b, 7a, 7b, 8.

Keywords: Mississippi River, water quality, forecasting, chemical data, biologic data, physical data, historical data.

127. Settles, J. C., Megard, R. O., and Krivit, D. A., 1979, Effect of temperature on the photosynthetic production of oxygen by algae; draft report: University of Minnesota Department of Ecology and Behavioral Biology, 9 p.

Abstract: The effect of temperature on rates of photosynthesis attained by planktonic algae in the segment of the Mississippi River that flows through Minneapolis-St. Paul where the algae appear to be saturated with nutrients during all seasons is described.

Keywords: Mississippi River, algae, dissolved oxygen.

128*. Skrypek, J., 1966, Analysis of physical and biological changes at selected sampling stations in the Mississippi River: Minnesota Department of Conservation, Division of Game and Fish.

Report Summary:

Keywords: Mississippi River, biologic survey.

129. Sinning, J. A., and Zimmerman, B. M., 1979, Evaluation of navigation effects on the biological components of the upper Mississippi River aquatic ecosystem: Prepared by ERT/Ecology Consultants, Inc., Fort Collins, Colorado for Upper Mississippi River Basin Commission, 36 p.

Report Summary: This report is a discussion, based on available documents, of the effects of navigation and the navigation pools on Mississippi River biota. It has an extensive bibliography. This is a companion volume to the report "Effects of navigation in inland waterways on the environment and related water-quality parameters; An annotated bibliography."

Keywords: Mississippi River, water quality, bibliography, navigation effects.

130. Southern Minnesota River Basin Commission, 1977, Minnesota River basin report: February 1977.

Report Summary: This report describes the background and development of a comprehensive basin management plan for the Minnesota River basin.

Keywords: Minnesota River, management plan.

131. Sprafka, M. J., Evaluation of heavy metal loadings at the Metropolitan Wastewater Treatment Plant: Metropolitan Waste Control Commission, 52 p.

Report Summary: Data generated at the Metropolitan Wastewater Treatment Plant demonstrating heavy metal (Cd, Cr, Cu, Pb, Ni, Zn) influent/effluent concentrations during operating conditions from January 1978 to May 1979 were compared to data generated from quarterly industrial reports for the same period. These industrial reports include effluent heavy metal concentrations and water volume use. The differences in these data were compared to preceding reports from the Metropolitan Waste Control Comission as well as corresponding literature sources. They indicate that non-industrial loadings are higher here than other metropolitan areas, but have decreased from the previous reporting period in most instances. This can be attributed to improved industrial reporting and initiation of pretreatment proceses.

Keywords: Pig's Eye waste treatment plant, metals.

132. Stefan, H., and Demetracopoulos, A., 1979, A model for water circulation and solute transport in pool No. 2 of the Mississippi River: University of Minnesota, St. Anthony Falls Hydraulic Laboratory, Project Report No. 186, 85 p.

Abstract: Low-flow water circulation in pool No. 2 of the Mississippi River was analyzed and the resulting flow distribution was used for the computation of mass (solute) transport through the system. The study establishes a basis for dynamic water-quality modeling at a very short time scale as appropriate, for example, for dissolved oxygen or suspended solids. A computer model was developed for pool No. 2. Documentation for the model is in the report.

Keywords: Mississippi River, computer models, water quality, pool 2.

133. Stefan, H., Ford, D. E., and Gulliver, J. S., 1975, Observations of cooling water discharge effects on ice covers and dissolved oxygen levels in selected Minnesota streams and lakes: University of Minnesota, St. Anthony Falls Hydraulic Laboratory, Project Report No. 155, 96 p.

Report Summary: Field observations and measurements were made at selected Minnesota stream and lake sites during the winter of 1973-74 to investigate the effects of cooling water effluents with emphasis on real or potential benefits. Extents of ice covers, ice thicknesses, and dissolved oxygen were measured. Some historical records for the upper Mississippi River relative to freezing dates, ice break-up dates, length of navigation season, power generation, and dissolved oxygen were assembled. Long-term trends show a significant decrease in ice coverage and an increase in dissolved oxygen in the upper Mississippi River in the vicinity of the Minneapolis-St. Paul metropolitan area during the winter months. Streams receiving cooling water inflows are generally found to have substantial reaches of open water. The effect on dissolved oxygen through increased surface aeration is very noticeable, but still needs to be evaluated in quantitative form. Open-water areas are not as predominant in lakes in which sinking thermal plumes have been observed frequently. The findings lend strong support to the notion that cooling water effluents in cold climates can have a beneficial effect in several different areas, including navigation, dissolved oxygen, and ice damage.

Keywords: Mississippi River, Minnesota River, water quality, thermal effluent study, dissolved oxygen.

134. Stefan, H., and Nguyen, C. V., 1976, Waste heat dissipation and effluent water temperatures from Black Dog Lake: University of Minnesota, St. Anthony Falls Hydraulic Laboratory, Project report No. 162, 64 p.

Report Summary: Northern States Power Company's Black Dog Power Generating Plant discharges its condenser cooling water into a pond called Black Dog Lake, which releases it through two outlets into the Minnesota River. In this study it was found that an average 63 percent of the heat load rejected by the plant was dissipated to the atmosphere by the lake from March 1974 through January 1975. Daily heat dissipation varied from 15 to 128 percent because of temporary heat storage in the lake under transient weather conditions. Daily lake effluent temperature fluctuations were determined and compared to Minnesota River temperature fluctuations. The lake very effectively reduces the impact of thermal discharges on the Minnesota River. Its effectiveness was found to vary with season, with a maximum in midsummer and a minimum in midwinter, presumably due to sinking plumes. A mathematical model of the unsteady well-mixed type predicts summer effluent water temperatures well, but is not applicable for winter conditions.

Keywords: Minnesota River, thermal effluent study.

135. Stefan, H., and Wood, Addison, 1976, Field investigations of water temperature stratification and wind effects on dissolved oxygen in pool No. 2 of the Mississippi River: University of Minnesta, St. Anthony Falls Hydraulic Laboratory, Project Report No. 163, 116 p.

Report Summary: Dissolved oxygen, water temperatures, Secchi depth, and surface-drift currents were measured in pool No. 2 of the Mississippi River during very low-flow conditions from August 24 through September 25, 1976, on 11 different days and under significantly varied weather condtiions. Water-quality parameters were found to vary, both in time and space and in direct relationship to prevailing weather, particularly wind and sunshine. With total river flows from approximately 1,000 to 2,000 ft^3/s, the measured dissolved-oxygen distributions, water temperatures, and transparencies were predominantly typical of a series of interconnected lakes and to a lesser degree typical of a river. Natural convection, density currents, and wind drift were found to be of great importance. Recovery from low dissolved oxygen levels due to the effluent from the Metropolitan Waste Treatment Plant occurred in the pool upstream from Dam No. 2 mainly as the result of photosynthesis, surface aeration, and the hydrodynamic exchange processes between different regions of the pool. The report includes the dissolved oxygen, water temperature, and Secchi depth data.

Data Types: 1a, 1b, 1c, 9.

Keywords: Mississippi river, pool 2, chemical data, physical data, dissolved oxygen.

136. Steiner, C. S., and Grothe, D., Flow-through bioassay of St. Paul Ammonia products, division on N-Ren Corporation, Pine Bend, Minnesota—July 23-27, 1976: U.S. Environmental Protection Agency, Central Regional Laboratory, Chicago, 26 p.

Report Summary: The study was done at the request of the Minnesota Pollution Control Agency. A 96-hour bioassay was conducted on St. Paul Ammonia Products from July 23-27, 1976, using the fish species Lepomis macrochirus (bluegill sunfish) and the algal species Selanastrum capricornatum. An LC_{50} could not be determined for the bluegill sunfish as the effluent was not sufficiently toxic. The effluent had an inhibitory effect on the growth of algal species. This inhibition was attributed to the concentration of copper present in the effluent.

Keywords: Mississippi River, bioassay.

137. Thompson, D. H., and Landin, M. C., 1978, An aerial survey of waterbird colonies along the upper Mississippi River and their relationship to dredged material deposits: U.S Army Corps of Engineers Waterways Experiment Station, Environmental Laboratory Publication D-78-13, 96 p.

Report Summary: This study was designed to determine the location of colonies and breeding populations of certain colonial waterbird species nesting in the flood plain of the upper Mississippi River from Alton, Ill. to St. Paul, Minn., and their relationship to dredged material deposits in the river. Two complete aerial surveys done in April and June 1977, along with visits on the ground, were used to census colonies and describe colony sites. The survey was limited to nesting habitat and to the seven large or conspicuous waterbird species that could be located from the air. No species were found nesting on dredged material. Information and data are presented on the heron rookeries in the Twin Cities area.

Data Types: 7, 9.

Keywords: Mississippi River, biological data, waterbirds.

138. TKDA/M&E, A Joint Venture, 1979, Annotated bibliography for metropolitan wastewater treatment plant: unpaged.

Report Summary: This is an internal document for the joint venture between Toltz, King, Duvall, Anderson and Associates and Metcalf and Eddy, Incorporated. To assist various "team members" working on the metropolitan wastewater treatment plant 201 facilities report locate material that may be useful to them, 184 books, articles, and reports were reviewed and annotated. The publications selected for review are those that might be useful in developing alternatives for the wastewater treatment plant.

Keywords: Bibliography, 201 study, Pig's Eye waste treatment plant.

139. TKDA/M&E, A Joint Venture, 1979, Existing environmental baseline for Metropolitan Wastewater Treatment Plant study: Metropolitan Waste Control Commission, 120 p.

Report Summary: This report presents a description of the natural and man-made environment of the Metropolitan Wastewater Treatment Plant area and vicinity as it will exist with the completion of the current construction projects expanding the plant's liquid and solids handling capabilities. The report considers the natural environment in terms of its topography, geology, soils, ground-water resources, surface-water resources, aquatic biota, wetlands, terrestial biota, and ambient air quality. The man-made environment analysis considers land use, historical and archaeological sites and areas, population, employment, aesthetics, noise, transportation, and energy.

Keywords: Mississippi River, Pig's Eye Lake, water quality, 201 study, biologic survey, Pig's Eye waste treatment plant.

140. Twin Cities—Upper Mississippi River Project, 1965, Report on hydrographic studies of the Mississippi, Minnesota, and St. Croix Rivers: U.S. Department of Health, Education, and Welfare, Federal Water Pollution Control Administration, 70 p.

Report Summary: The report is an accumulation of individual reports on the hydrographic aspects of the rivers within the Twin Cities metropolitan area. The data was intended to be used with water-quality data of the rivers. The chapters are: (1) hydrographs, (2) mean stream depths, (3) range of mean monthly discharges, (4) mean flow velocities, (5) range of daily discharge, (5) low-flow frequency. Dye tracer studies were used to calculate mean flow velocities for each stream segment.

Data Types: 1b, 7a.

Keywords: Mississippi River, Minnesota River, St. Croix River, physical data, statistical analysis.

141. Twin Cities—Upper Mississippi River Project, 1966, Report on biological investigations of the Mississippi, Minnesota, and St. Croix Rivers: U.S. Department of the Interior, Federal Water Pollution Control Administration, 41 p.

Report Summary: This report presents the data gathered and the interpretations made from studies of: (1) bottom organisms, (2) attached algal growths, (3) phytoplankton, (4) rooted higher aquatic plants, (5) fish-flesh taste evaluation, and (6) sludge bank locations. The studies were conducted from April 1, 1964, through October 1965. Data is in the form of short tables and graphs.

Data Type: 6.

Keywords: Mississippi River, Minnesota River, St. Croix River, water quality, biologic survey.

142. Twin Cities—Upper Mississippi River Project, 1966, A report on pollution of the upper Mississippi River and major tributaries: U.S. Department of the Interior, Federal Water Pollution Control Commission, 305 p.

Report Summary: This is a study on pollution in the upper Mississippi River basin in Minnesota and Wisconsin made in response to the "Conference in the matter of pollution of the interstate waters of the upper Mississippi River," February 1963. Data on the water quality of the rivers studied in 1964-65 is presented.

Keywords: Mississippi River, Minnesota River, water quality.

143*. Twin Cities—Upper Mississippi River Project, 1974, Summary and pollution abatement recommendations for the upper Mississippi River and major tributaries: Federal Water Pollution Control Administration, St. Paul, 60 p.

Report Summary: The investigation of water pollution along the upper Mississippi River and its major tributaries is reported. The investigation was conducted to gather information on water quality, sources and quantities of wastes, the extent of pollution, and necessary abatement measures in the following river reaches: Upper Mississippi River from the Rum River at Anoka, 107 miles downstream to the outlet of Lake Pepin; lower 110 miles of the Minnesota River; and the lower 52 miles of the St. Croix River.

Keywords: Mississippi River, Minnesota River, St. Croix River, water quality, management plan.

144**. U.S. Army Corps of Engineers, St. Paul District, 1935, Report on sedimentary characteristics of the Upper Mississippi River.

Report Summary:

Keywords: Mississippi River, sediment.

145. U.S. Army Corps of Engineers, North Central Division, 1969, Report on streambank erosion study of the upper Mississippi region (in compliance with section 210, 1968 Rivers and Harbors Act): 98 p.

Report Summary: The report detailed the estimated amount of streambank erosion occurring in each of 17 subbasins to the Mississippi River north of Cairo, Ill. The costs of correcting the streambank erosion were also estimated. The amount of streambank erosion that was estimated to occur was not considered a serious threat to the productive land base of the region.

Keywords: Mississippi River, Minnesota River, sediment.

146. U.S. Army Corps of Engineers, North Central Divsion, 1978, Summary report of fish and wildlife habitat changes resulting from the construction of a nine-foot channel in the upper Mississippi River, Minnesota River, St. Croix River, and Illinois Waterway.

Report Summary: Specific objectives of the study were to establish an historical context in which to examine current changes in the environments of the rivers; and to provide quantitative analysis of habitat changes with some qualitative interpretation of changes.

Keywords: Mississippi River, Minnesota River, St. Croix River, navigation effects, water quality, biologic survey.

147. U.S. Army Corps of Engineers, St. Paul District, 1965, An investigation of thermal pollution in streams, supplemental report No. 1: 50 p.

Report Summary: This is a supplement to the report "An investigation of thermal pollution of streams," 1964. This study was carried out December 1964 through March 1965 in the Mississippi and Minnesota Rivers within the Minneapolis-St. Paul metropolitan area. The purpose of the study was to refine the heat energy budget method used in the earlier report to correlate heat energy introduced into a normally ice-covered stream by municipal and industrial plants with the heat loss from the area of open water downstream.

Keywords: Mississippi River, Minnesota River, thermal effluent study.

148. U.S. Army Corps of Engineers, St. Paul District, 1969, Master regulation manual for Mississippi River nine-foot channel navigation projects: 13 volumes.

Report Summary: The master manual has been prepared to provide guidance and instructions for project personnel and to serve as a reference source for higher authority. Volume 1 contains information common to all the nine-foot channel projects. The detailed information of the operation of specific projects are in appendices contained in the remaining 12 volumes.

Keywords: Mississippi River, navigation, management plan.

149. U.S. Army Corps of Engineers, St. Paul District, 1974, Final environmental impact statement, operation, and maintenance of 9-foot navigation channel, upper Mississippi River, head of navigation to Guttenberg, Iowa: 648 p.

Report Summary: There are two volumes. Volume 1 contains the narrative of the impact statement; volume 2 contains exhibits such as maps, tables, figures, and letters referred to in the narrative. The statement deals with the operations and maintenance of the 9-foot channel navigation system on the upper Mississippi River within the St. Paul District of the Corps of Engineers. It includes the Mississippi River from the head of navigation to Guttenberg, Iowa, and the affected reaches of the lower St. Croix, Black, and Minnesota Rivers. The 9-foot channel project itself and past conditions are discussed only for purposes of establishing trends to evaluate the present and further impacts of the current method of operating and maintaining the navigation system.

Keywords: Mississippi River, Minnesota River, St. Croix River, navigation effects, environmental impact statement.

150. U.S. Army Corps of Engineers, St. Paul District, 1979, Water withdrawal and discharge data for the Minnesota River: Minnesota Department of Natural Resources, 42 p.

Report Summary: This inventory of surface-water withdrawal and discharge data was made for the river reach extending from Browns Valley, Minn. to the mouth or junction with the Mississippi River. All known water users and discharges including municipalities, industries, and power plants along the main stem and major tributaries were identified and inventoried. The data inventory was based on permit data available at the Minesota Pollution Control Agency and the Minnesota Department of Natural Resources supplemented by field and telephone contacts with various other state agencies, Federal agencies, and community and industry officials. This study report summarizes known water withdrawal and discharge data by decade for the year 1930 to 2000 for the following Minnesota River control points (USGS gaging station) and principle tributaries:

Gaging stations	Major tributaries
Ortonville	Lac qui Parle River
Odessa	Yellow Medicine River
Lac qui Parle	Redwood River
Montevideo	Cottonwood River
Judson	
Mankato	
Jordan	
Confluence with Mississippi River	

All data tabulated for these locations is presented in average monthly and average annual cubic feet per second units over the period of analysis.

Keywords: Minnesota River, water quantity.

151. U.S. Army Corps of Engineers, St. Paul District, 1981, 1981-1985 navigation, public notice of channel maintenance dredging, 64 p.

Report Summary: Discusses the authorization for dredging in the upper Mississippi River, dredging methods, studies conducted on effects of dredging, and the recommendations of the GREAT study. It lists historical dredging sites, the frequency of dredging at the site, the average volume dredged per job, the average volume dredged per year, and the last year dredged. A list of potential dredge material placement sites is included. Potential dredging sites are indicated on navigation charts of the upper Mississippi River.

Keywords: Mississippi River, dredging.

152. U.S. Department of Health, Education, and Welfare, Public Health Service, Region VI, 1963, Water-resources study, Mississippi river headwaters reservoirs, Minnesota: U.S. Army Corps of Engineers, St. Paul District, 69 p.

Report Summary: The purpose of this study was to determine the present and prospective needs and values of storage in the existing headwaters reservoirs for municipal and industrial water supply and water-quality control from the Mississippi river headwaters to the junction of the St. Croix River. The scope of this investigation covered the base year (1965) and the 50-year projections (2015) of the requirmenets for municipal and industrial water supply and water-quality control purposes.

Keywords: Mississippi River, headwater reservoirs, water quality, forecasting.

153. U.S. Department of Health, Education, and Welfare, 1964, Conference in the matter of pollution of the interstate waters of the upper Mississippi River; St. Paul, Minnesota, February 8, 1964: 6 volumes.

Report Summary: This is the proceedings of the conference. It contains some analyses and data of the water quality of the upper Mississippi River prior to 1964.

Keywords: Mississippi River, Minnesota River, water quality.

154. U.S. Environmental Protection Agency, Water Planning Division, 1980, 208 data clearinghouse: 303 p.

Report Summary: The 208 Data clearinghouse was originated to aid local agencies in obtaining technical reports of other agencies that may contain applicable solutions toward plan completion and implementation. This issue of the Clearinghouse incorporates the four previous editions as well as all new materials received since their publication. It contains annotated citations in 39 categories reviewing all aspects of water-quality management.

Keywords: Bibliography, 208 study.

155. U.S. Fish and Wildlife Service, 1976, Fish and wildlife technical report: Upper Mississippi River Basin Commission Fish and Wildlife Task Group, Minneapolis-St. Paul Area Level B Study, 254 p.

Report Summary: The report covers the Twin Cities metropolitan area. The report has four objectives: (1) to describe and inventory existing fish and wildlife resources including population, habitats, and the uses made of fish and wildlife, (2) to identify conflicts and problems with other uses having significant impacts on fish and wildlife resources, (3) to develop recommendations to resolve the major (Level B) fish and wildlife problems, and (4) to promote enhancement of fish and wildlife on all lands, public and private.

Keywords: Metropolitan area, wildlife.

156. U.S. Geological Survey, 1976, Water-resouces investigations in Minnesota, 1976: 2 pl.

Report Summary: This is a bibliography of selected water-resources investigations reports for Minnesota. U.S. Geological Survey, Minnesota Department of Natural Resources, and selected other reports are included. Includes open-file reports of the U.S. Geological Survey not included in "Geologic and water-supply reports and maps, Minnesota" July 1976.

Keywords: Bibliography.

157. U.S. Geological Survey, 1976, Geologic and water-supply reports and maps, Minnesota: July 1976, 21 p.

Report Summary: This is a bibliography of all U.S. Geological Survey reports and maps containing information about the state of Minnesota. The bibliography covers the period from the first report in 1883 to 1976. A list of the reports and maps issued by the Minnesota District Office of the Water Resources Division of the U.S. Geological Survey since 1976 are available from the Minnesota District Office.

Keywords: Bibliography.

158*. U.S. Public Health Service, 1951, Upper Mississippi drainage basin; A cooperative State-Federal report on water pollution: Upper Mississippi and Great Lakes Drainage Basins Office, Chicago, Ill., 99 p.

Report Summary: The report presents information about the ways water resources are used, the pollution going into our water resources, and the resulting damages, the benefits that may result from pollution prevention and abatement, the pollution prevention measures now in effect, and those required. There are two parts. Part one considers the water-pollution problems of the basin as a whole. Part two briefly presents the data for each of the several subbasins of the major basin, including a tabulation of pollution abatement projects now known to be needed for water-pollution control.

Keywords: Mississippi River, water quality.

159*. U.S. Public Health Service, 1953, Upper portion upper Mississippi River drainage basin; A cooperative State-Federal report on water pollution: Upper Mississippi and Great Lakes Drainage Basins Office, Chicago, Ill., 90 p.

Report Summary: The report is based on data available as of January 1, 1953, on sources of pollution and treatment facilities employed, and on stream conditions revealed by field surveys made by the Minnesota Department of Health over a period extending from 1939 through 1952. The report also presents information concerning use of water resources, pollution entering water resources and resulting damages, and benefits that may result from pollution prevention and abatement. The report has been limited to known sources of pollution and their effects upon adjacent streams.

Keywords: Mississippi River, water quality, historical data.

160*. U.S. Public Health Service, 1955, A comprehensive water pollution control program for the lower portion upper Mississippi River basin developed by the state water pollution control agencies of Iowa, Minnesota, and Wisconsin: Division of Water Supply, Cincinnati, Ohio, 76 p.

Report Summary: The report, prepared in cooperation with the water pollution control agencies of Iowa, Minnesota, and Wisconsin, sets forth the water pollution control program being followed by the respective states in the lower portion upper Mississippi River basin. The program, which is based on data available as of November 1, 1954, was developed after a thorough consideration of the existing and potential uses of the water resources in the basin; the pollution entering the streams and lakes, and the resulting damages; the benefits that may result from pollutin prevention and abatement; and the prevention measures now in effect as well as those that are needed.

Keywords: Mississippi River, management plan, water quality.

161*. U.S. Public Health Service, 1963, Water pollution surveillance system, upper Mississippi River basin: Division of Water Supply and Pollution Control, Washington, D.C., 121 p.

Report Summary: The report presents water-quality data for major river basins in the upper Mississippi River basin. The data was compiled from October 1, 1961 through September 30, 1963, and covers radioactivity, plankton, organic chemicals, ammonia, chlorine demand, color, oxygen demand, temperature, minerals, turbidity, trace elements, coliform bacteria, and streamflow.

Keywords: Mississippi River, water quality, historic data.

162*. Upper Mississippi River Basin Commission, 1977, Level B-technical paper: Water Quality.

Report Summary: There are two areas of focus; (1) water quality in pool 2, and (2) nonpoint pollution of metropolitan area lakes.

Keywords: Mississippi River, pool 2, water quality.

163. Upper Mississippi River Basin Commission, 1978, Minneapolis-St. Paul water and land—future perspectives and plans, Level B study report and environmental impact statement: 164 p.

Report Summary: This is a planning document for management of all users of the Mississippi River in the Twin Cities metropolitan area.

Keywords: Minnesota River, Mississippi River, forecasting, management plans.

164. Upper Mississippi River Basin Commission, 1981, Draft comprehensive master plan for the management of the upper Mississippi River system: 181 p.

Report Summary: This draft report contains the conclusions and recommendations resulting from a 2-year study conducted by Federal and State agencies in cooperation with local government and the public. The studies were designed and conducted in response to the directives contained in P.L. 95-502, Section 101. The studies addressed economic, environmental, and recreational management of the upper Mississippi River system with focus on the impacts to those areas as related to any expansion of navigation capacity of the system. The study is confined to the navigable parts of the upper Mississippi River system.

Keywords: Management plan, Mississippi River, Minnesota River, St. Croix River.

165. Upper Mississippi River Basin Coordinating Committee, 1972, Upper Mississippi River comprehensive basin study: 9 volumes.

Report Summary: The purpose of the study was to develop and recommend a framework for use in future detailed planning to realize the desired utilization of the resource base with priorities for action. The study was accomplished through a series of reconnaissance investigations adequate to provide broad-scaled analyses of water and related land-resource problems, and to furnish general appraisals of the nature, extent, and timing of their solutions. The study considered all geographic areas within the upper Mississippi River basin and all purposes served by conservation, development, and use of water and related land resources. The study consists of a main report that summarizes the findings of the 17 supporting appendices.

Keywords: Mississippi River, management plan, forecasting.

166*. Upper Mississippi River Conservation Commission, 1977, PCB pollution in the upper Mississippi River: UMRCC, Ad Hoc PCB Committee Report, 13 p.

Report Summary: PCB pollution and resultant contamination of fish and wildlife of the upper Mississippi River is of great concern to the citizens and communities located along the river. This concern resulted in extensive investigations and monitoring of the upper Mississippi River by Federal and State fish and wildlife, pollution control, and public health agencies. The UMRCC Ad Hoc PCB Committee met in fall 1976 and reviewed the actions regarding PCB's and PCB data of member agencies. This report presents a brief summary of investigations and monitoring programs performed by various State and Federal agencies.

Keywords: Mississippi River, PCB's.

167. Wallace, McHarg, Roberts, and Todd, Consultants, 1969, Final report, An ecological study of the Twin Cities metropolitan area: Metropolitan Council of the Twin Cities Area, 106 p.

Report Summary: The purpose of the study is to inventory phenomena and natural processes, to reconstitute these as a value system, and to perceive the degree to which land, air, and water processes offer both opportunities and restraints to single and combined prospective land uses.

Keywords: Metropolitan area, biologic survey.

168**. Water Resources Engineers, 1974, Final report for the upper Mississippi River basin model project.

Report Summary:

Keywords: Mississippi River, water quality, computer modeling.

169. Water Resources Engineers, 1975, NCWQ-Section II, Upper Mississippi River basin final report: Presented to the National Commission on Water Quality, 123 p.

Report Summary: The primary objective of the study was to determine the quality of the surface waters in the upper Mississippi River basin under various pollution abatement levels. The study area is the Mississippi River from St. Cloud to the Chippewa River, the St. Croix River from St. Croix Falls to its mouth, and the Minnesota River from New Ulm to its mouth. Projections for various steady-state flow conditions were made using the QUAL-II computer model.

Keywords: Mississippi River, Minnesota River, St. Croix River, water quality, forecasting, computer modeling, QUAL-II.

170*. Water Resources Engineers, Inc., 1975, Water-quality analysis, upper Mississippi River basin: Walnut Creek, California; National Commission on Water Quality, Washington, D.C., 115 p.

Report Summary: A comprehensive water-quality analysis of the upper Mississippi River basin was undertaken as part of a national assessment of anticipated environmental impacts of theoretically achieving or not achieving the requirements and goals of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The report (1) characterized historical and existing water-quality conditions and (2) projected resultant water quality within the basin, assuming specific levels of wastewater treatement to point-source effluents entering the study site. The assessment is one of 41 similar studies conducted for the Environmental Sciences sector of the Commission.

Keywords: Mississippi River, water quality, forecasting.

171*. Wicks, J. L., 1930, Pollution of the upper Mississippi River: Trans. Amer. Fish. Soc., v. 60, p 286-296.

Report Summary: Discusses the effects of the sewage of the Twin Cities on the Mississippi River and to wildlife refuges in the vicinity.

Keywords: Mississippi River, water quality, wildlife.

172*. Williams, L. G., 1962, Plankton population dynamics: Public Health Publication No. 663, Supplement 2.

Report Summary: A study that investigated the major phytoplankton communities of the Mississippi River near East St. Louis,Burlington, Dubuque, and St Paul. Diatoms were the most prevalent organisms.

Keywords: Mississippi River, algae.

173*. Williams, L. G., 1964, Possible relationships between plankton-diatom species numbers and water-quality estimates: Ecology, v. 45, no. 4, p. 809-823.

Report Summary: Semimonthly samples from 103 scattered stations on the major rivers and Great Lakes of the United States reveal differences in kinds and numbers of dominating planktonic organisms. Diatoms dominate at these stations.

Keywords: Mississippi River, algae.

174*. Williams, L. G., 1966, Dominant planktonic rotifers of major waterways of the United States: Limnology and Oceanography, v. 11, p. 83-91.

Report Summary:

Keywords: Algae.

175*. Williams, L. G., 1972, Plankton diatom species biomasses and the quality of American rivers and the Great Lakes: Ecology, v. 11, p. 83-91.

Report Summary:

Keywords: Algae.

176*. Williams, L. G., and Scott, C., 1962, Principal diatoms of major waterways of the United States: Limnology and Oceanography, v. 7, no. 3, p. 365-379.

Report Summary:

Keywords: Algae.

SECTION 2.—COMPUTER-MODEL CITATIONS

Model Name: RIVER.

Model Type: One-dimensional steady-state water-quality model.

Developer: Hydroscience, Inc.

Held By: Metropolitan Waste Control Commission.

Mounted On: University of Minnesota CYBER system.

Status: Working.

Contact Person: Drew McAvoy, MWCC.

Documentation: Hydroscience, Inc., 1979, Upper Mississippi River 208 grant, water-quality modeling study, revised August, 1979: Metropolitan Waste Control Commission, 126 p.

Description: Program RIVER is a steady-state water-quality model with specific applications in the analysis of one-dimensional advective water systems. It is designed for the analysis and projection of water quality under particular environmental conditons that include the calculation of spatial distribution of dissolved oxygen as well as carbonaceous and nitrogenous BOD during conditions not dominated by algae. This model is presently being used for winter conditions on the Mississippi River from UM 871 to UM 815.

Model Name: AESOP

Model Type: Multi-dimensional steady-state water-quality model.

Developer: Hydroscience, Inc.

Held By: Metropolitan Waste Control Commission.

Mounted On: University of Minnesota CYBER system.

Status: Working.

Contact Person: Drew McAvoy, MWCC.

Documentation: Hydroscience, Inc., 1979, Upper Mississippi River 208 grant, water-quality modeling study, revised August 1979: Metropolitan Waste Control Commission, 126 p.

Description: Program AESOP is a versatile water-quality simulation program that was structured to model the effects of various water-quality constituents and geophysical parameters on a stream, river, lake, or estuary environment. AESOP can address multidimensional water-quality settings and various kinetic structures that define the interrelationships between the water-quality constituents of interest. This model is presently being used on the Mississippi River from UM 840 to UM 815.

Model Name: RMA-12.

Model Type: One-dimensional steady-state water-quality model.

Developer: Resource Management Associates.

Held By: Metropolitan Waste Control Commission.

Mounted On: University of Minnesota CYBER system.

Status: Working.

Contact Person: Drew McAvoy, MWCC.

Documentation: Norton, W. R., 1977, Operating instructions and program documentation for the computer program RMA-12: Resource Management Associates.

Description: The model RMA-12 provides a numerical simulation of water-quality behavior in free surface, one-dimensional open-channel systems. The model will accommodate tree shaped, branching configurations, but will not accept looped systems. The model will perform either steady-state or dynamic quality routing for a given flow regimen, but has no capability to perform other than steady-state flow routing internally. This model is currently being used on the Minnesota River from MI 30 to the Mississippi River confluence.

Model Name: Minneapolis-St. Paul Load Generator (MSPLG).

Model Type: Statistical urban rainfall-runoff model.

Developer: Hydroscience for Ganoram, Inc., A Joint Venture

Held By: Metropolitan Waste Control Commission.

Mounted On: University of Minnesota CYBER system.

Status: Working.

Contact Person: Drew McAvoy, MWCC.

Documentation: Hydroscience, Inc., 1979, Calibration report for the SPAM statistical model, Mississippi River at Minneapolis-St. Paul: Metropolitan Waste Control Commission, 242 p.

Description: This model is a rainfall-runoff model constructed specifically for the Twin Cities metropolitan area. The model generates runoff quantities at specific locations throughout the study area as a response to rainfall input. The generated runoff is used as input to the SPAM model. The generated runoff is expressed as long-term mean runoff flows. In addition, estimates of flows that might be exceeded at prescribed percents of time are calculated. Also calculated are estimates of the variability in runoff load, as percentile loading rates around a mean condition. The mean flows and loads calculated in the model are the variables on which receiving water variability computations are ultimately based in the SPAM model.

Model Name: SPAM.

Model Type: Statistical runoff and receiving water-quality model.

Developer: Hydroscience for Ganoram, Inc., A Joint Venture.

Held By: Metropolitan Waste Control Commission.

Mounted On: University of Minesota CYBER system.

Status: Working.

Contact Person: Drew McAvoy, MWCC.

Documentation: Hydroscience, Inc., 1979, Calibration report for the SPAM statistical model, Mississippi River at Minneapolis-St. Paul: Metropolitan Waste Control Commission, 242 p.

Description: SPAM is a statistical runoff and receiving water-quality model and is used to evaluate the relative contributions of different types of continuous and wet-weather sources. This model has been used in the past to compute seasonal percentile concentrations of fecal coliform in the Mississippi River from UM 871 to UM 815.

Model Name: WASP.

Model Type: One-dimensional dynamic time-variable water-quality model.

Developer: Hydroscience, Inc.

Held By: HydroQual and Metropolitan Waste Control Commission.

Mounted On: Magnetic Tape.

Status: Not presently usable.

Contact Person: Drew McAvoy, MWCC.

Documentation: None.

Description: WASP is a time-variable water-quality model that was designed to use the output from SWMM as its input parameters. This model was never set up in a usable form for the Mississippi River.

Model Name: A model for water circulation and solute transport in pool No. 2 of the Mississippi River.

Model Type: Quasi-steady-state flow and cells-in-series mass transport.

Developer: A. Dematracopoulos and H. Stefan, St. Anthony Falls Hydraulic Laboratory.

Held By: St. Anthony Falls Hydraulic Laboratory.

Mounted On: Unknown.

Status: Unknown.

Contact Person: Dr. Heinz Stefan, St. Anthony Falls Hydraulic Laboratory.

Documentation: Stefan, Heinz, and Demetracopoulos, A., 1979, A model for water circulation and solute transport in pool No. 2 of the Mississippi River: University of Minnesota, St. Anthony Falls Hydraulic Laboratory, Project Report No. 186: 85 p.

Description: Pool No. 2 of the Mississippi River has a fairly complex geometry. It was analyzed as a network of 17 fixed boundary segments, taking into account gravity forces, bed shear stresses, local (minor) energy losses, and wind effects. The hydrodynamic equations were solved for quasi-steady-state conditions. A 6-hour interval was used, and the validity of this choice was verified by a transient response analysis of the system.

The mass transport was analyzed with a cells-in-series type model. Division of the fixed boundary segments into a variable number of subsegments was used to account for the observed dispersion. Good agreement was found between computed time-concentration curves and three sets of dye concentrations.

Model Name: GROWTH.

Model Type: Estimates photosynthetic growth rate in Mississippi River.

Held By: MWCC.

Mounted On: University of Minnesota CYBER system.

Contact Person: Drew McAvoy, MWCC.

Documentation: Combs, W. S., Jr., 1977, User's manual for GROWTH: A program for the estimation of daily rates of photosynthesis by phytoplankton in the Mississippi River: University of Minnesota, Department of Civil and Mineral Engineering, 30 p.

Description: The model is designed to provide estimates of daily rates of photosynthesis by planktonic organisms in natural waters. The model was tailored specifically for use in studies of the Mississippi River by the Metropolitan Waste Control Comission. The program requires three types of empirical information: (1) the temporal variation of the incident radiation, (2) the transmission of radiation with depth in the river, and (3) the photosynthesis-irradiance relationship, P(I). Also needed are an estimate of the mixed layer depth and the chlorophyll concentration in the water.

SECTION 3.—DATA CITATIONS

1. Data Form: Report.

   Data Type: 6e.

   Citation: Feiler, E. L., 1979, An electrofishing survey of a portion of pool 2, Mississippi River, from Lock and Dam No. 2 (RM 815) to Upper Grey Cloud Island (RM 827) August 8 to September 21, 1979: Minnesota Department of Natural Resources, Division of Fish and Wildlife, 30 p.

   Description: An electrofishing survey of pool 2, Mississippi River, was started in August 1979 to obtain current information regarding the composition and status of the fish population. The 1979 work covered the lower 12 miles of pool 2 from Lock and Dam No. 2 (river mile 815) to the upstream end of Grey Cloud Channel (river mile 827) in Upper Grey Cloud Island. The fish species captured are tabulated by number and weight at each station.

2. Data Form: Report.

   Data Types: 1a, 1b, 9.

   Citation: Hall, F. E., Report on flow and related conditions during Mississippi River intensive survey, February 24, 25, and 26, 1965: 26 p.

   _____ Report on flow and related conditions during Minnesota River intensive survey with addendum on Minnesota River intensive survey, November 18, 19, and 20, 1964: 28 p

   _____ Report on flow and related conditions during Mississippi River intensive survey, January 27 and 28, 1965: 8 p

   _____ Report on flow and related conditions during Minnesota River intensive survey, February 9, 10, and 11, 1965: 26 p.

   Description: The reports are carbon copies held in the time-of-travel data files of the U.S. Geological Survey for the 1976 and 1977 time of travel studies. Weather, time of travel, flow, mean depth at cross sections, and cross-section width data are included in the reports.

3. Data Form: Report.

   Data Type: 6e.

   Citation: Hanson, Steve, 1980, 1980 Mississippi River, pool II electrofishing survey: Minnesota Department of Natural Resources, Ecological Services Section memorandum, November 7, 1980, 13 p.

   Description: An electrofishing survey was done September 24-29, 1980, in pool 2 of the Mississippi River to check fish populations above and below the Pig's Eye Treatment Plant. Fish species, fish length, and fish numbers are presented in tables. A comparison of the data with 1979 data for reaches of the river is given. A short analysis of the data is presented.

4*. Data Form: Report.

Data Type: 4d.

Citation: Hora, M. E., 1975, PCB investigation of the Mississippi River and its tributaries water, bottom sediment, and point sources: Minnesota Pollution Control Agency, Division of Water Quality, 25 p.

Description: Samples were collected from the surface waters and bottom sediments of the Mississippi River from Elk River, Minn. to Alma, Wis. and from the following tributaries to the Mississippi: Minnesota, St. Croix, Rum, Cannon, Vermillion, and Crow Rivers; Hay Creek; and Pig's Eye Lake. Samples were collected from the discharges of 34 wastewater treatment plants and 61 industries. The sampling was done in summer 1975. The data are presented in tables. It was concluded that bottom sediments are a better indicator of PCB pollution than surface-water samples. Only one industry and three wastewater treatment plants had PCB concentrations above the detection limit (0.4 ppb).

5. Data Form: Report.

Data Types: 4d, 6e.

Citation: Krosch, H. F., 1980, Results of PCB analyses: Minnesota Department of Natural Resources, Ecological Services Section, memorandum dated April 25, 1980, 4 p.

Description: The data for PCB analyses of fish from pools 2 and 3 of the Mississippi River are presented. The fish were caught in summer 1979. The analyses were made of the edible parts of the fish. The length, weight, concentration of PCB's, species of fish, and the location the fish was caught is given for each fish caught. For each species the equation for the linear regression of ppm PCB's versus weight were calculated. The mean weight and mean PCB concentration were also calculated for each species.

6. Data Form: Report.

Data Types: 1a, 1b, 1c, 1d, 2a, 4a, 4b.

Citation: Maderak, M. L., 1963, Quality of waters, Minnesota—A compilation, 1955-62: Minnesota Conservation Department, Division of Waters, Bulletin 21, 104 p.

Description: Has water-quality data for several streams and wells in Minnesota. Has data for Mississippi River near Anoka, 1960-62, and Minnesota River at Montevideo, 1961-62. There is a general discussion of the chemical quality of surface and ground water in Minnesota.

7. Data Form: Report.

Data Types: 1a, 1c, 1d, 2, 3a, 3b, 8.

Citation: Metropolitan Sewer Board, Quality Control Department, 1974, Data report, Minnesota River survey, August 19-24, 1974: 30 p.

Description: A cooperative investigation of the water quality of the Minnesota River from Jordan to its Mississippi River confluence, was carried out by the Minnesota Pollution Control Agency and the Metroplitan Sewer Board of the Twin Cities area. The survey was in August 1974.

The report is in two sections: section I includes the analysis on the discharges of the Chaska, Savage, Blue Lake, and Seneca wastewater treatment plants; section II includes data from the automatic water-quality monitors at Jordan and Fort Snelling. The majority of the data for the Jordan monitor are missing.

The data are in the form of weekly summaries and daily summaries. The daily summary shows the water-quality constituents at 15-minute intervals.

8. Data Form: Report.

Data Types: 1a, 1b, 1c, 1d, 2, 3, 4a, 4c, 9.

Citation: Metropolitan Waste Control Commission, 1977, Final report of the water-quality survey during summer low flow (1976) for water-quality management studies as authorized under Section 208 of PL 92-500: 177 p.

Description: An intensive 15-day water-quality field investigation was conducted by the Metropolitan Waste Control Commission August 19-September 2, 1976, wherein samples were obtained every 6 hours from 16 Mississippi River locations from Anoka, Minn., UM 871.6, to the Highway 61 bridge at Hastings, Minn., UM 813.9. Samples were also obtained at 9 major point-source discharges to the Mississippi River in the Mnneapolis-St. Paul area. This water-quality survey was conducted as part of the 208 area-wide waste treatement management planning grant application of the Metropolitan Council. The data collected are presented in the report.

Cross Reference: Data about the photosynthesis—irradiance measurements are available as computer printouts from MWCC.

9. Data Form: Report.

Data Types: 1a, 1c, 1d, 2, 3a, 3b, 4c.

Citation: Metropolitan Waste Control Commission, 1977, Report of the winter survey (1977) for water-quality management studies as authorized under Section 208 of PL 92-500: 31 p.

Description: Tabulations of the data collected from February 15 to March 10, 1977, in pool 2 of the Mississippi River.

10. Data Form: Report.

Data Types: 1a, 1c, 2, 3a, 3c, 4c.

Citation: Metropolitan Waste Control Commission, Quality Control Department, 1978, Data report of the algal productivity and nutrient investigations for water-quality management studies as authorized under Section 208 of PL 92-500: 67 p.

Description: Field and laboratory investigations were conducted to obtain data on algal productivity and particulate and soluble nitrogen and phosphorus concentrations for the Mississippi River in the Minneapolis-St. Paul area. The data were collected as part of a 208 study during August, September, and October 1976.

11. Data Form: Report.

Data Type: 3c.

Citation: Metropolitan Waste Control Commission, 1978, Report of the sediment oxygen demand field investigations for water-quality management studies as authorized under Section 208 of PL 92-500: 81 p.

Description: The objectives of the sediment oxygen demand field studies were to provide data to determine oxygen uptake rates exerted by the river sediments at several locations in the study area and to provide data to estimate that areal extent of the sediment oxygen demand. The sediment oxygen demand data are presented in the form of graphs and tables. The data were collected at nine sites between St. Paul (UM 843.5) and Nininger (UM 817.8) in September 1976, and July, August, and September 1977.

12. Data Form: Report.

Data Type: 3b.

Citation: Metropolitan Waste Control Commission, 1979, Report of the carbonaceous and nitrogenous BOD studies for water-quality management studies as authorized under Section 208 of PL 92-500: 163 p.

Description: The objectives of the biochemical oxygen demand (BOD) studies were to determine BOD loadings from significant point sources and to determine rate coefficients for deoxygenation of point sources and river samples. River samples were analyzed for four BOD species: total carbonaceous BOD, soluble carbonaceous BOD, total nitrogenous BOD, and soluble nitrogenous BOD. Samples were processed for determination of total BOD and deoxygenation rates. Data are presented for each of the 28 sites sampled in 1977 from Anoka to Hastings, Minn.

13**. Data Form: Report.

Data Type: 11.

Citation: Metropolitan Waste Control Commission, Quality Control Department, 1979, Summary report on the sampling of sewer outfalls and the Mississippi River for the Minneapolis East Interceptor Bypass, September 25, 1979 through January 18, 1979: 24 p.

Description:

14. Data Form: Report.

Data Types: 1, 2, 3, 4, 5, 6c, 6d, 8, 9.

Citation: Metropolitan Waste Control Commission, 1981, Data report: Minnesota River flow survey, summer 1980: 77 p.

Description: An intensive water-quality field investigation was conducted from August 12-20, 1980. Eight stations on the lower Minnesota River from Shakopee, Minn. (MI 23.9) to the confluence with the Mississippi River (MI 0.0), 20 tributaries, 3 waste treatment plant effluents, and 4 industrial discharges were sampled.

River samples were collected by boat at mid-channel up to three times daily and up to three elevations in the river. Treatment plant samples were taken as part of routine monitoring program.

15. Data Form: Report.

Data Types: 1a, 1b, 1c, 1d, 2, 3, 4, 5, 6c, 8, 7.

Citation: Metropolitan Waste Control Commission, 1981, Data report: Minnesota River low-flow survey, summer 1980: 77 p.

Description: This survey was part of a 208 study. The purpose of this survey was to gather water-quality information for use in verifying the computer model, RMA-12, which was calibrated for this segment of the Minnesota River. Data obtained during this survey, in conjunction with the modeling work, will be used for allocating waste load contributions by point-source discharges to the river.

16. Data Form: Report.

Data Type: 6e.

Citation: Minnesota Conservation Department, 1959, A fisheries survey of the Minnesota River, Mankato to mouth: 52 p.

Description: A fisheries survey begun in 1958 and concluded in 1959 examined 107 miles of the lower part of the Minnesota River.

17. Data Form: Report.

Data Types: 1a, 1c, 1d, 3a, 4b.

Citation: Minnesota Department of Health, Division of Water Pollution Control, Minnesota River Survey, July 11-20, 1949.

Description: The information contained in the report is in the form of tables, field notes, and laboratory sheets. The report is held by the Minnesota Pollution Control Agency.

18**. Data Form: Report.

Data Type: 11.

Citation: Minnesota Department of Health, 1952, Memorandum on survey of the Mississippi River from above Minneapolis at the Minneapolis water works intake to below Minneapolis at the Ford Dam, December 17, 1951 to January 17, 1952.

Description: Other reports by the Department of Health with historical data are cited below.

____ 1949, Analytical data from investigations of the lower Mississippi River, February 24 and May 24, 1949.

__ 1948, Mississippi River survey, Hastings to LaCrosse: Mimeographed.

____ 1953, Water pollution in the Mississippi River basin: U.S. Health Education, and Welfare Department, Public Health Services Appendices.

____ 1958a, Report on investigation of waste disposal at St. Paul Ammonia Products, Inc., and Liquid Carbonic Division, General Dynamics Corp., and survey of the Mississippi River in the Pine Bend area, Dakota County, July 22-25, 1958.

____ 1958b, Report on investigation of waste disposal, Minnesota Mining and Manufacturing Company, Chemolite Plant, Washington County, September 22-26, 1958.

____ 1958c, Memorandum on investigation of radioactiity in the Mississippi River from Elk River to Hastings, July 22 to August 1, 1975, and July 22 to August 14, 1958.

19**. Data Form: Report.

Data Type: 11.

Citation: Minnesota Department of Natural Resources, 1959, Biological survey of the Minnesota River.

Description:

20**. Data Form: Report.

Data Type: 11.

Citation: Minnesota Department of Natural Resources, 1972, Game lake survey (Pig's Eye Lake): Federal aid project PR-FW-R-17.

Description:

21. Data Form: Report.

Data Types: 4d, 6e.

Citation: Minnesota Department of Natural Resources, Division of Fish and Wildlife Ecological Services Section, 1977, Annual report on mercury levels in fish in the Mississippi, Red, and St. Louis Rivers, Minnesota, 1977: Special Publications No. 127-A, 28 p.

Description: Fish flesh was analyzed for total mercury levels. The fish were taken from the Red River at Halstad and Oslo, the St. Louis River at Cloquet and Brookston, the Mississippi River at Grand Rapids, St. Cloud, and Monticello in 1977. The species, weight, length, and concentration of mercury found is given for every fish sampled. A comparison with the annual mercury levels data back to 1970 is included.

Other reports that are similar and include the same type of information are:

Glazer, R., 1977, Annual report of mercury levels in fish in the Mississippi, Red, and St. Louis Rivers, Minnesota, 1976: Minnesota Department of Natural Resources, Division of Fish and Wildlife Ecological Services Section, Investigational Report No. 357, 20 p.

Moyle, J. B., 1972, Mercury levels in Minnesota fish: Minnesota Department of Natural Resources, Division of Game and Fish, Special Publication No. 97, 10 p.

22. Data Form: Report.

Data Types: 1a, 1b, 6e.

Citation: Testimony of the Minnesota Department of Natural Resources (John L. Skrypek and John W. Enbloom) in the matter of the proposed amendments to MPCA rules WPC 14, 15, and 25, and the proposed repeal of WPC 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 18, 20, 21, 23, 26, 29, 31, and 32: PCA-80-004-AK, 34 p.

Description: The testimony compares the results of fish surveys in 1964 and 1979 to dissolved oxygen and river flow at the time the surveys were conducted. The surveys covered the Mississippi River from its confluence with the Minnesota River to Lock and Dam 2. A dramatic increase in the diversity of fish below the Pig's Eye treatment plant was noted between 1964 and 1979, and was associated with increased dissolved oxygen and higher flows in 1979. Fish survey data for 1964 and 1979 is presented.

23. Data Form: Report.

Data Type: 6e.

Citation: Minnesota Department of Natural Resources, 1981, Metropolitan cooperative fisheries survey, conducted in cooperation with the Minnesota Pollution Control Agency and the Metropolitan Waste Control Commission.

Description: The report contains electrofishing information at 21 stations on the Mississippi River. The study was conducted in the summer of 1981. In addition, at seven stations ten fish were collected for priority pollutant analysis by the MWCC. (Information for this citation is from Jack Enblom of the MDNR, Ecological Services Section.)

24. Data Form: Report.

Data Types: 1a, 1c, 1d, 2, 3a, 3b, 4, 5.

Citation: Minnesota Pollution Control Agency, Division of Water Quality, 1975, Investigation of the USCE dredging operation on the Mississippi River at Grey Cloud Island, September 10, 1975: 11 p.

Description: Water-quality parameters were sampled above and below the clamshell dredging operation of the Derrickbarge Hauser at river mile 823.6. Data are presented in tables.

25. Data Form: Report.

Data Type: 6b.

Citation: Minnesota Pollution Control Agency, 1979, Biological monitoring program; A compilation of biological data for 1976 and 1977: 98 p.

Description: Biological monitoring was begun in 1976. Macroinvertebrate data are presented in this report.

26. Data Form: Report.

Data Types: 4d, 6e.

Citation: Moyle, J. B., and Skrypek, J. L., 1969, Levels of DDT, DDE, and aldrin in muscle and brain tissue of some Minnesota fishes, 1962-1967: Minnesota Department of Conservation, Division of Game and Fish, Special Publications No. 59, 15 p.

Description: Analyses for DDT and DDE were made for 134 fish; analyses for aldrin were made for 8 fish. The date and location each of the fish were taken, the species, and the concentrations of DDT, DDE, and aldrin found are given in the tables.

Other similar reports with the same kind of information are:

Moyle, J. B., and Skrypek, J. L., 1972, Concentrations of some organochlorine insecticides and the PCB, Arochlor 1254, in flesh and brain tissue of Minnesota fish collected in 1969: Minnesota Department of Natural Resources, Division of Game and Fish, Special Publication No. 95, 24 p.

Skrypek, J. L., 1973, Concentrations of some organochlorine insecticides and polychlorinated biphenyls in fish and brain tissue of Minnesota fish collected in 1970: Minnesota Department of Natural Resources, Division of Game and Fish, Special Publication No. 103, 30 p.

27. Data Form: Report.

Data Type: 6e.

Citation: Skrypek, J. L., 1969, Differences in the composition of the fish population in pool 2 and other areas of the Mississippi River as related to waste from the Twin Cities metropolitan area—1964: Minnesota Department of Conservation, Division of Game and Fishes, Section of Technical Services, Investigational Report No. 307, 17 p.

Description: Electrofishing and trapnets were used to make an exploratory survey of fish population of pool 2 in August and September, 1964. Fish were taken from the river between Lock and Dam 1 and Lock and Dam 2. The number of fish taken in a river reach is broken down into species and number of species taken per trapnet. The species and number of fish in length of fish groups for each reach of the river is also presented.

Other similar reports that present the same kind of data are:

Feiler, E. L., An electrofishing survey of a portion of pool 2, Mississippi River, from Lock and Dam No. 2 (RM 815) to Upper Grey Cloud Island (RM 827), August 8 to September 21, 1979: Minnesota Department of Natural Resources, Division of Fish and Wildlife, 31 p.

Hansen, S., 1980, Mississippi River, pool 2 electrofishing survey: Minnesota Department of Natural Resources, Ecological Surveys Section, memorandum dated November 7, 1980, 13 p.

28. Data Form: Report.

Data Type: 6e.

Citation: Tureson, Fred, 1978, A creel census and water-surface-use study of the Mississippi River from the Coon Rapids dam to the mouth of the Minnesota River, May 8 to September 30, 1976: Minnesota Department of Natural Resources, Division of Fish and Wildlife, Section of Fisheries, Fish Management Report No. 3, 39 p.

Description: A total of 1,868 anglers were interviewed. The fishing pressure per acre, estimated harvest of fish, and non-fishing recreational pressure on the censused part of the rivers were calculated.

29. Data Form: Report.

Data Types: 6a, 6b, 6e, 7c.

Citation: Twin Cities Upper Mississippi River Project, 1966, Appendix to report on biological investigations of the Mississippi, Minnesota, and St. Croix Rivers: U.S. Department of the Interior, Federal Water Pollution Control Administration, 29 tables.

Description: Contains data from surveys made in spring, summer, and fall 1964 and winter 1964-65. Bottom organisms, periphyton, rooted aquatic plants, chlorophyll a, artificial substrates, and fish taste panels were the type of surveys conducted.

30**. Data Form: Report.

Data Types: 1e, 11.

Citation: U.S. Army Corps of Engineers, St. Paul District, 1935, Report on sedimentary characteristics of the upper Mississippi River.

Description:

31. Data Form: Report.

Data Type: 6f.

Citation: U.S. Department of the Interior, Federal Water Pollution Control Administration, 1966, Report on pathogenic bacteria and enteric virus survey conducted in cooperation with the Minnesota Department of Health, FWPCA Great Lakes—Illinois River Basin Project, and the PHS Communicable Disease Center Field Station: 12 p., 8 tables.

Description: Contains tabulated data of enteric viruses and pathogenic bacteria surveys made in the Mississippi River from Anoka to Red Wing, Minn., July through October 1965.

32. Data Form: Report.

Data Types: 1a, 2, 3a, 3b (note: data types were not recorded when report was reviewed).

Citation: U.S. Environmental Protection Agency, Pacific Northwest Environment Research Laboratory, 1975, Report on Spring Lake, Washington and Dakota Counties, Minnesota: U.S. Environmental Protection Agency, Region V, Working Paper No. 127, 33 p.

Description: Spring Lake was sampled in 1972 and 1973 as part of a national eutrophication survey. It was one of 60 Minnesota lakes surveyed. Data are in tables. Some statistical analysis is done.

Other Sources: STORET.

33**. Data Form: Report.

Data Type: 11.

Citation: Water Resources Engineers, 1972, Data report for the upper Mississippi River basin; an intermediate technical report.

Description:

34. Data Form: Report Series.

Data Types: 1a, 1d, 1c, 2a, 3a, 3b, 4c.

Prepared By: Metropolitan Waste Control Commission.

Series Title: Quality Control Report, Wastewater Treatment Plant Data.

Description: The report series covers the years 1975 to present. Data for 1971-74 are in the 1975 report. Summaries for each of the wastewater treatment plants operated by the Metropolitan Waste Control Commission are given.

35. Data Form: Report series.

Data Types:

Year	1 a b c d e	2 a b	3 a b c	4 a b c	5	6 a b c d e f	7 a b c	8	9
1971	x x x x -	x x	x - -	- - -	-	- - - - - -	- - -	-	x
1972	x - x x -	x x	x - -	- - -	-	- - - - - -	- - -	-	x
1973	x x x x -	x x	x x -	x x x	-	- - - - - -	- - -	-	x
1974	x x x x -	x x	x x -	x x x	-	- - - - - -	- x -	-	x
1975	x x x x -	x x	x x -	x x x	x	- - - - - -	- x -	-	x
1976	x x x x -	x x	x x -	x x x	x	- - - - - -	- x -	-	x
1977	x x x x -	x x	x x -	x x x	x	- - - - - -	- x -	x	x
1978	x x x x -	x x	x x -	x x x	x	- - - - - -	- x -	x	x
1979	x x x x -	x x	x x -	x x x	x	x x - - - -	- x -	x	x
1980	x x x x -	x x	x x -	x x x	x	x x - - - x	- x -	x	x

Data type in each report by year

Prepared By: Metropolitan Waste Control Commission, Quality Control Department.

Series Title: Water-quality report of river water quality in the Minneapolis-St. Paul metropolitan area.

Description: Issued annually by Quality Control Department of the Metropolitan Waste Control commission since 1971. Until 1975 it was called "Quality Control Report, River Analytical Data." Data was collected only monthly until 1973 when automatic water-quality monitors were transferred from the EPA to the MWCC and an additional automatic monitor was installed. A cooperative program with the USGS was started in 1973. Currently, in addition to monthly grab samples, automatic sampling stations measure DO, pH, temperature and specific conductance, which are stored as 15-minute values at the Seneca Wastewater Treatment Plant.

36. Data Form: Report series.

Data Types: 1a, 1c, 1d, 2, 3a, 3b, 4, 5.

Prepared By: Minnesota Pollution Control Agency.

Series Title: Water-quality sampling program, Minnesota lakes and streams.

Description: The routine water-quality-monitoring program of the MPCA has been in operation since 1953. The results have been compiled in 10 volumes issued at irregular intervals. The stations have been sampled monthly since 1968.

Other Sources: The data are also in the STORET data base.

37. Data Form: Report series.

Data Types: 1, 2, 4, 5, 6, 9.

Prepared By: Northern States Power Company.

Description: Northern States Power Company publishes an annual Environmental and Ecological Studies Program report for the Marticello Nuclear Power Plant, Prairie Island Nuclear Power Plant, and the Sherburne County Generating Plant. The reports have been issued since at least 1968 for the Monticello power plant, 1973 for the Prairie Island power plant, and 1975 for the Sherburne County power plant. The information contained in the reports vary from year to year and power plant to power plant but include water quality in the river, trace metals in aquatic life, aquatic ecology studies, and inventories.

38. Data Form: Report series.

Data Types: 1a, 1c, 2, 4a, 4b, 6d.

Prepared By: St. Paul Board of Water Commissioners.

Series Title: Annual report of Board of Water Commissioners, St. Paul, Minnesota.

Description: The report series dates from 1882 to present. In 1979, weekly samples of Mississippi River water were analyzed for chemical, physical, and biological parameters. Data are reported as monthly means.

39. Data Form: Report series.

Data Type: 1b.

Prepared By: U.S. Army Corps of Engineers, Mississippi River Commission; Vicksburg, Mississippi.

Series Title: Stages and discharges of the Mississippi River and its outlets and tributaries.

Description: Prior to 1943 the discharge and stage records were published in separate report series. Gage height records since 1866 are available (winter records incomplete). Discharge records for water years 1867-69, 1872-92, and March 1892 to present are available. The records since March 1892 are available in WATSTORE. See the station header for the gaging station on the Mississippi River at St. Paul in the U.S. Geological Survey publication "Water-resources data for Minnesota," for more information on data available and the quality of the data.

40. Data Form: Report series.

Data Type: 1b.

Prepared By: U.S. Geological Survey.

Series Title:

Description: Records of daily flows of streams in Minnesota before 1971 were published in the U.S. Geological Survey's Water-Supply Paper series "Surface-water supply of the United States," which was released in numbered parts as determined by natural drainage basins. Until 1961 this was an annual series; monthly and yearly summaries of these data are compiled into two reports: "Compilation of records of surface waters of the United States through September 1950" and "Compilation of records of surface waters of the United States, October 1950 to September 1960." For 1961-70, 5-year compilations were published. Data for Minnesota are published in Parts 4, 5, and 6. Daily streamflow records were also published on a State-boundary basin during 1961-74 as open-file reports of the U.S. Geological Survey. Since 1975, streamflow data, water-quality data for surface and ground water, and ground-water-level data from the basic network of observation wells have been published annually in a series titled "Water-resources data for Minnesota."

Other Sources: The data are also available from the U.S. Geological Survey's national data base, WATSTORE.

41. Data Form: Report series.

Data Types: 1a, 1c, 1d, 1e, 2, 3a, 4a, 4b, 5, 6a, 6d.

Prepared By: U.S. Geological Survey.

Series Title:

Description: Data on quality of surface water before 1971 were published annually in the U.S. Geological Survey's Water-Supply Paper series "Quality of surface waters of the United States," which were released in numbered parts as determined by natural drainage bains. Data for Minnesota are in Parts 4, 5, and 6. For water years 1964-74, these data were also released annually on a State-boundary basin as open-file reports of the U.S. Geological Survey. Since 1975 these data have been published annually in the report series "Water-resources data for Minnesota."

Other Sources: These data are also available from the U.S. Geological Survey's national data base, WATSTORE.

42. Data Form: Manual.

Data Types: 1a, 1b, 1c, 1d, 2, 3a, 3b, 4.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Computer printouts of analyses made by the USGS for the MWCC as part of the cooperative program between them. The data are from 1973 and 1974. Bound in a loose-leaf binder titled "River water quality analytical data, cooperative USGS-MSB program."

43. Data Form: Manual.

Data Types: 1a, 7b, 8.

Held By: Metropolitan Waste Control Commission, Quality Control Section.

Person Responsible. Drew McAvoy.

Description: The data are in the form of office files of the MWCC automatic monitoring system. The files go back to 1973, the year MWCC acquired the automatic monitoring stations from the EPA. The data is cataloged according to the calendar year, January 1 to December 31, in loose-leaf 3-ring binders. There are three binders for each year. One contains daily treatment plant and river-quality reports. The second contains monthly summaries of river-quality data for each automatic monitoring station. The third contains the field notes of the servicing and calibration of each automatic monitoring station.

44. Data Form: Manual.

Data Types: 1d, 1e, 3c, 10.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: The data are in the form of bound copies of office, field, and laboratory notes. There are two volumes. Volume 1 consists of cross-sectional profiles of the river, 1928-35; volumetric computations of sludge deposits and water above Lock and Dam 1 (Ford dam) for 1928; BOD, and fixed solids of bottom sediments for 1930-36; dissolved oxygen, bacteria, coli-aerogenes organisms, specific gravity, volatile solids, and turbidity of bottom sediments for 1932-36. The sampling sites are varied.

Volume 2 consists of handwritten tabulations of analysis of samples taken in 1934 and 1935 at various stations on the Mississippi River. Temperature, turbidity, pH, dissolved oxygen, BOD, bacteria, and coli-aerogenes organisms were the characteristics determined.

Cross Reference: This information is located no where else.

45. Data Form: Manual.

Data Types: 1a, 1c, 1d, 3a.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Data are bound in a 3-ring loose-leaf binder titled "Historical data." Data are xeroxed pages of grab-sample data of the intake to the Minneapolis water supply from 1927 to 1970.

46. Data Form: Manual.

Data Types: 1a, 2, 3a, 3b, 4a, 4b.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: The river grab-sample data collected by the Metropolitan Waste Control Commission and its predecessors are summarized for 1934-80. For each year the frequency at which each water-quality constituent is sampled at each sampling location is listed. The data collected before 1973 are in individual volumes as field notes, lab notes, and tabulations.

47. Data Form: Manual.

Data Types: 1a, 8.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Field data for the 1977 wet-weather survey for the combined sewer overflow study. Information consists of measured dissolved oxygen, pH, temperature, sampling depth, meter calibration, remarks, and sampling time and date. Data are arranged by station number.

48. Data Form: Manual.

Data Types: 3a, 3b.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: The data consist of the following tabulations: chlorophyll a, b, and c concentrations collected in 1976 by sampling location, ultimate BOD's, and K-rates for metropolitan secondary effluent, industries, and the Mississippi River collected in 1976 and 1977, cumulative BOD's for metropolitan secondary effluent and the Mississippi River collected in 1977.

49. Data Form: Manual.

Data Types: 1a, 1d, 2, 3.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Data are in the form of lab notes, tabulations, graphs, and summaries. Data collected on June 14, 1976, from the Mississippi River and the Metropolitan Waste Treatment Plant.

50. Data Form: Manual.

Data Type: 2.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Tabulation of nitrogen and phosphorus data collected from the Mississippi River between May 29 and June 7, 1976.

51. Data Form: Manual.

Data Type: 2.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Phosphorus and nitrogen budget tabulations for data collected August 19-September 2, 1976, as part of the low-flow survey of the Mississippi River.

52. Data Form: Manual.

Data Types: 1a, 1d, 2, 3a, 4c, 3c.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Data are in the form of tabulations and summaries of data collected August 1-October 6, 1977. The data are grouped into algal kinetics, particulate organisms, nitrogen species, and phosphorus species.

53. Data Form: Manual.

Data Types: 1a, 1c, 3a.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Summary of the following data: solids and turbidity from Mississippi River collected July 16, 1976; dissolved oxygen collected October 14-15, 1976; chlorophyll a and total chlorophyll collected September 16, 1977; and specific conductivity collected October 31, 1977.

54. Data Form: Manual.

Data Types: 1a, 1d, 2, 3b.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Data from the August 1973 river survey in the form of tabulations, summaries, lab notes, and graphs. Bound in a loose-leaf binder labeled "1973 Survey."

55. Data Form: Manual.

Data Types: 1a, 8.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Field data for the August-September 1978 wet-weather river survey for a 201 combined sewer overflow study. Data consist of river temperature, dissolved oxygen, pH, sampling time, sampling depth, meter calibration, and remarks. Data arranged by sampling station.

56. Data Form: Manual.

Data Types: 1a, 1b, 1d, 2, 3a, 3b, 4b, 5.

Held By: Metropolitan Waste Control Commission.

Person Responsible: Hugh McConnell.

Description: Data are from 201 combined sewer overflow studies. The storm or combined sewers from 10 small urban watersheds in Minneapolis and St. Paul were monitored for flow and sampled for water quality. The rainfall on the watersheds was also monitored. The data consist of laboratory worksheets, field notes, and plots of loads and flow for each watershed.

57. Data Form: Manual.

Data Types: 1a, 1d, 2, 3a, 3b.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Data are in the form of tabulations of each parameter measured at each location. Data were taken July 29-31, 1976, during a preliminary survey before the 208 study low-flow sampling program. The purpose was to design a cost-effective sampling program for the low-flow water-quality survey. Conclusions as to sampling frequency and to replicacy of the samples are presented.

58. Data Form: Manual.

Data Types: 1a, 1b, 1d, 2, 3, 7a.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Data are in three loose-leaf binders titled "208 data volume I, volume II, volume III." A description of the data in each volume follows:

Volume I: (1) Dissolved oxygen, temperature, pH, and biological productivity measured with respect to depth and time for the diurnal survey of the Mississippi River conducted October 6-7, 1977.

(2) Automatic monitor 15-minute data (dissolved oxygen and temperature) for October 9-14, 1977.

(3) Analysis of point sources grab-samples collected September 20-October 3, 1977 (wet-weather survey).

(4) Analysis of Mississippi River grab-samples collected October 5, 1977 (dry-weather survey).

Volume II: (1) LC_{50} ratios for fathead minnows in Chemolite, Inc., plant effluent determined March 1977.

(2) NPDES permits monitoring reports for N-Ren Corporation, March 1977.

(3) Notes on determining 7-day 10-year low-flow design flows.

(4) Biologic productivity data collected August-September 1977.

(5) Sediment oxygen demand data collected September 1977.

(6) NPDES permit reports for February-March 1977.

(7) Calibration of model RIVER with winter 1977 data.

Volume III: (1) Time-of-travel data in the Mississippi River collected by the U.S. Geological Survey in 1976 using dye-tracer techniques.

(2) Design-flow computations for the 7-year 10-day low flow.

(3) AESOP users' manual.

59. Data Form: Manual.

Data Types: 1a, 1c, 1d, 2, 3a, 3b, 4b.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Data were collected as part of a combined sewer overflow 201 study of the Mississippi River. Data are in lab notes, field notes, tabulations, summaries, and graphs. Data were collected during (1) the September 1977, August 1978, and September 1978 wet-weather surveys, (2) the October 1977 dry-weather survey, (3) the October 1977 diurnal survey, (4) the industries survey for September-October 1977 and October 1978, (5) the August 1977, August 1978, and September 1978 combined sewer overflow sites sampling, and (6) the October 1978 combined sewer overflow dry-weather discharge sampling. Data are in six loose-leaf binders.

60. Data Form: Manual.

Data Type: 10.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Helen Boyer.

Description: Transcripts of 1975 waste load allocation hearings held by the Minnesota Pollution Control Agency. Bound in two loose-leaf binders.

61. Data Form: Manual.

Data Type: 10.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Drew McAvoy.

Description: Data consist of bound computer lineprinted output. The output is from calibration runs of the AESOP model, with and without nitrification; calibration runs of the RIVER model; and river quality and load allocation studies.

Cross Reference: Most of the computer output is held at the Minnesota Pollution Control Agency by Jerry Winslow.

62**. Data Form: Manual.

Data Type: 11.

Description: The following unpublished data by the Minnesota Department of Health was cited in a literature survey by the NALCO Corp. (see the reports section of this inventory).

1. 1933, Bacteria and water-quality data.
2. 1940, Biological examination of sediments, St. Cloud to Fridley.
3. 1946, Analytical data from investigations of the lower Mississippi River, August 12-15, 1946.
4. 1947, Phytoplankton data from Lock and Dam Nos. 2, 3, 4, 5, and 6.
5. 1948, Phytoplankton data, Hastings to Lock and Dam 4.

63. Data Form: Manual

Data Type: 6e.

Held By: Minnesota Department of Natural Resources, Division of Games and Fish.

Person Responsible: Steve Hanson.

Description: Field sheets for electrofishing runs August through November 1978 on the Mississippi River from the Ford Dam to Hastings. The species of fish and the length of each fish caught is recorded.

64. Data Form: Manual.

Data Types: 1a, 1c, 6e.

Held By: Minnesota Department of Natural Resources, Ecological Services Section.

Person Responsible: Jack Enblom.

Description: The Ecological Services Section has files for streams in Minnesota. The files hold correspondence about the streams, fishing information, and other information about the stream. According to Jack Enblom, most of the information in the files is old with little current information.

65. Data Form: Manual.

Data Type: 7.

Held By: Minnesota Pollution Control Agency.

Person Responsible: Dave Maschwitz.

Description: Statistical analysis, and correlation and regression analysis have been done to physical and chemical data for the Mississippi River from UM 816 to UM 872 from 1971 to present. The data were collected by the U.S. Geological Survey, the Metropolitan Waste Control Commission, and the Minnesota Pollution Control Agency. Metals data from National Pollution Discharge Elimination System compliance reports have been used. The following data types were analyzed: 1a, 1d, 2, 3a, 3b, 4a, 4b, 5. The data are in the form of computer printouts.

66. Data Form: Manual.

Data Types: 1a, 1c, 1d, 2, 3a, 3b, 4, 5.

Held By: Minnesota Pollution Control Agency, Enforcement Section.

Person Responsible:

Description: Discharge monitor reports (DMR's) are filed monthly by industries and agencies with National Pollution Discharge Elimination Permits. The pollutants sampled for and the sampling frequency vary from permit holder to permit holder.

67*. Data Form: Manual.

Data Type: 10.

Held By: Soil Conservation Service.

Person Responsible:

Description: Watershed inventory maps by county, scale 1:126,720 are available from the Soil Conservation Service.

68. Data Form: Manual.

Data Type: 10.

Held By: U.S. Army Corps of Engineers, St. Paul District.

Person Responsible:

Description: The Corps of Engineer's maintenance branch makes hydrographic surveys of the historic dredging sites to determine if dredging must be done. The frequency of the surveys vary with the frequency of dredging required at each site. The records are held for about 5 years.

69. Data Form: Manual.

Data Type: 10.

Held By: U.S. Army Corps of Engineers.

Person Responsible:

Description: Upper Mississippi River navigation charts are published by the U.S. Army Corps of Engineers. They cover the navigable parts of the upper Mississippi River, including the lower Minnesota and St. Croix Rivers.

70. Data Form: Manual.

Data Types: 1b, 8, 9.

Held By: U.S. Geological Survey.

Person Responsible: Greg Payne.

Description: Time-of-travel studies using dye-tracer techniques were conducted in 1976 and 1977 on the Mississippi River between Anoka and Hastings, Minn. and on the Minnesota River below Jordan, Minn. Data were obtained at flow rates of 2,000, 5,000, and 9,000 ft^3/s in the Mississippi River and 250 and 1,000 ft^3/s in the Minnesota River. Data consist of river cross sections, wind speed and direction, flourometer calibration records, computation sheets for time-of-travel, and graphs of concentration versus time at each of the 18 sampling sites. Data are summarized in several memoranda and an unpublished basic-data report. These are kept with the data from the field surveys.

71. Data Form: Computer data base.

Data Types: 1a, 1b, 1c, 1d, 2, 4, 5.

Held By: Metropolitan Waste Control Commission, Quality Control Department.

Person Responsible: Drew McAvoy.

Description: The data are stored in a data base called SIR on the University of Minnesota CYBER computer. Data stored on the data base fall into the following groups. Group 1: Data listed as routine physico-chemical data in the MWCC "1980 Water-quality report." In previous reports it is listed as routine manual sampling data or grab-sampling data. Data stored are from 1976 to present. Group 2: Metals analyzed by the USGS, as listed in the MWCC "Water-quality reports." Data stored are from 1976 to 1979. Group 3: Flow data from 1976 to 1979. Group 4: Automatic monitor data from 1978-81 stored as daily maximum, minimum, and mean values. The data stored have been edited. Group 5: USGS grab-sampling data from 1976-79. Group 6: Hydroscience low-flow survey data base. Future plans are to store biomonitoring data from 1978 to 1980 and metals data from 1980 on the SIR data base.

72. Data Form: Computer data base.

Data Types: 1a, 1b.

Held By: Metropolitan Waste Control Commission.

Person Responsible: Drew McAvoy.

Description: The automatic monitor data for the Mississippi River is stored as 15-minute values on a PDP 11/70 computer at the Seneca wastewater treatment plant. The data stored are from 1973-81.

73. Data Form: Computer data base.

Data Types: 1a, 1d, 2, 3a, 3b, 4a, 4b, 5.

Held By: Minnesota Pollution Control Agency.

Person Responsible: Dave Maschwitz.

Description: Data collected by the U.S. Geological Survey, the Metropolitan Waste Control commission, and the Minnesota Pollution Control Agency from 1971 to present for UM 816 to UM 872 of the Mississippi River have been put into a single SAS data set.

74. Data Form: Computer data base.

Data Types: 1a, 1b, 1d, 1e, 2, 3a, 3b, 4c, 5, 9.

Held By: U.S. Geologial Survey.

Person Responsible: Rob Brown.

Description: Stormwater runoff for 17 sampling sites distributed between six rural and four urban receiving streams (seven stormwater subwatersheds in the four urban basins) were monitored during calendar year 1980. From 15 to 30 snowmelt and rainfall events, in addition to baseline samples, were collected at each site. Automatic water samplers were placed in 12 of the watersheds. The study determined watershed basin characteristics, including land uses, management practices, and wetland areas for each watershed in the region. The data are stored on the U.S. Geological Survey's WATSTORE data base.

75. Data Type: 10.

Study: Nonpoint pollution studies of lakes and streams in the Twin Cities metropolitan area

Conducted By: Rob Brown, U.S. Geological Survey.

Description: Seventeen storm sewered watersheds in the Twin Cities metropolitan area were gaged for flow and sampled for water quality. Statistical models were developed to estimate stormwater characteristics for ungaged or unsampled stormsewered watersheds in the metropolitan area using the data obtained from the seventeen gaged watersheds. Both urban and rural watersheds were studied. The final report was being written in December 1981.

76. Data Type: 10.

Study: Load allocation study for the lower Minnesota River.

Conducted By: Jack Frost, Metropolitan Council for the Twin Cities area.

Description: This is an ongoing study as of December 1981 to determine load allocations for the lower Minnesota River from Chaska to the mouth, using the RMA-12 model.

REPORT INDEX

DATA CATEGORIES FOR THE DATA INDEX

The following data categories are used in the keynumber index. The data are grouped into eleven major categories, each further grouped into subcategories. Under each subcategory is a listing of the data types that are included in it. This listing is intended to be only representative of the data types in the category; it is not all-inclusive of the data types actually found during the data search.

1. PHYSICAL CHARACTERISTICS

   a. Commonly sampled characteristics

      Water temperatures
      pH
      Dissolved oxygen
      Specific conductance

   b. Hydraulic characteristics

      Streamflow
      Average velocities
      Instantaneous velocities
      Stage
      Travel time

   c. Turbidity and color

      Turbidity
      Color
      Secchi-disk depth
      Light attenuation coefficient

   d. Other physical characteristics

      Volatile suspended solids
      Total dissolved solids
      Suspended solids
      Settleability
      Oil and grease

   e. Sediment

      Suspended
      Bottom
      Size
      Type
      Specific gravity

2. NUTRIENTS

a. Nitrogen

Ammonia nitrogen
Nitrite nitrogen
Nitrate nitrogen
Total Kjeldahl nitrogen
Particulate Kjeldahl nitrogen

b. Phosphorus

Total phosphorus
Particulate phosphorus
Ortho-phosphorus

3. BIOLOGIC CHARACTERISTICS

a. Biologic indicators

Total coliform
Fecal coliform
Fecal Streptococcus
Total organic carbon
Suspended organic carbon
Particulate organic carbon
Viable chlorophyll a
Total chlorophyll
Chlorophyll a
Adenosine triphosphate

b. Biochemical oxygen demand (BOD)

Total 5-day BOD
BOD series (ultimate)
Total carbonaceous BOD
Soluble carbonaceous BOD
Total nitrogenous BOD
Soluble nitrogenous BOD
Inhibited and non-inhibited BOD

c. Others

Sediment oxygen demand
Biologic productivity
Enrichment studies

4. CHEMICAL CHARACTERISTICS

a. Major ions

Calcium
Magnesium
Sodium
Potassium
Bicarbonate
Sulfate
Chloride

b. Alkalinity and hardness

Carbonate hardness
Non-carbonate hardness
Alkalinity
Carbon dioxide

c. Other

Chlorine residual
Phenol
Particulate oxygen demand
Total chemical oxygen demand
Sodium asorption ratio

d. Pesticides and other pollutants

DDT
Aldrin
Dieldrin
PCB's

5. LOW-CONCENTRATION METALS

Aluminum, total, dissolved, suspended
Arsenic
Barium
Beryllium
Cadmium
Chromium
Copper, total, dissolved, suspended
Cyanide
Iron, total, dissolved
Lead
Manganese, total, dissolved, suspended
Mercury, total, dissolved, suspended
Nickel
Selenium
Silver
Strontium, total, dissolved, suspended
Vanadium
Zinc, total, dissolved, suspended.

6. BIOLOGIC SURVEYS

a. Periphyton

Taxon determination
Mean ash free weight
Autotrophic index
Mean cell density
Geometric mean cell density
Shannon diversity index
Incubation time, days
Chlorophyll a, b, c

b. Macroinvertebrates

Taxon determination
Mean number of organisms/substrate
Number of unique taxa
Shannon diversity index
Incubation time
Number of taxa
Habitat
Density

c. Zooplankton

Taxon determination
Number

d. Plankton/phytoplankton

Total weight
Ash free weight
Genera
Counts

e. Fish

Taxon
Length-frequency distribution
Community structure
Length and weight

f. Bacteria

Enteric

7. STATISTICAL ANALYSIS OF DATA

   a. Hydrologic

   b. Chemical

   c. Biologic

8. INSTRUMENT CALIBRATION AND ERROR ANALYSIS

   When calibrated
   Deviation
   Percent error
   Error analysis of data

9. METEOROLOGICAL DATA

   Temperature
   Wind Speed
   Solar radiation
   Insolation
   Sky cover
   Precipitation
   Ice thickness

10. MISCELLANEOUS

   River cross sections
   Ongoing studies

11. DATA NOT SEEN BUT CITED IN A REPORT

DATA INDEX

DATA INDEX

* After number indicates a report cited in the Reports Section.