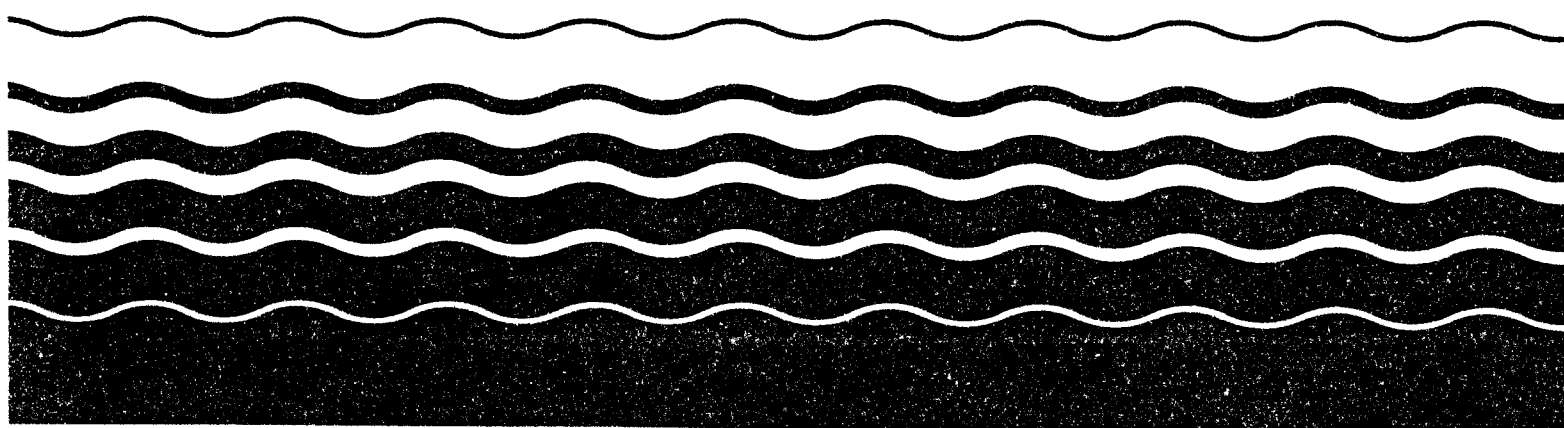


Water Division



Master Plan for Improving Water Quality in the Grand Calumet River/Indiana Harbor Canal Summary

Final



FINAL REPORT

MASTER PLAN FOR
IMPROVING WATER QUALITY IN THE
GRAND CALUMET RIVER/INDIANA HARBOR CANAL
Summary, Conclusions and Recommendations

January, 1985

USEPA-REGION V
Water Division
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P R E F A C E

The Grand Calumet River/Indiana Harbor Canal (GCR/IHC) drains a narrow, heavily industrialized watershed area of northwest Indiana, at the southern tip of Lake Michigan. Water quality and aquatic habitat problems in the GCR/IHC have been a matter of public concern for more than a decade. These problems are reflected in high concentrations of conventional, and toxic pollutants in the river sediments and overlying water column, and in sharply reduced levels of biological activity.

On November 15, 1983, the International Joint Commission convened a meeting to receive citizens' comments regarding the pollution control needs of the GCR/IHC. At this meeting, the U.S. EPA, Region V committed to the preparation of a plan, in consultation with the U.S. Army Corps of Engineers and the Indiana State Board of Health, for improving water quality in the GCR/IHC. This report has been prepared in fulfillment of this commitment.

The Master Plan report includes a discussion of existing environmental problems and pollutant sources, a presentation of existing water quality control programs, and recommendations for improving water quality and aquatic habitat conditions in the GCR/IHC.

This report was originally released in draft form to provide an opportunity for agencies, industries, municipalities and other affected publics to comment on the content of the report and the recommendations proposed. A public meeting addressing the report was held in Gary, Indiana on October 25, 1984. These comments are much appreciated and have been considered in preparation of the final report. Further comments are still welcomed and may be addressed to:

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Note:

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1. SUMMARY AND CONCLUSIONS

Environmental problems in the Grand Calumet River/Indiana Harbor Canal (GCR/IHC) include high concentrations of conventional, nonconventional and toxic pollutants in the sediments and overlying water column. Although improved point source controls have resulted in significant improvements in ambient water quality conditions in recent years, the contaminated sediments continue to represent a major in-situ reservoir of accumulated pollutants.

Although compliance problems persist for municipal dischargers, major regulated industrial pollutant sources are generally in compliance with their NPDES discharge limits. However, these limits are based largely on oxygen-demanding substances, including BOD (biological oxygen demand), COD (chemical oxygen demand), nitrogen, and ammonia. While DO (dissolved oxygen) values in the GCR/IHC have risen dramatically in recent years, biological recolonization of the river has been limited. Given the current status of point source controls, it is suspected that continued discharge of toxic and nonconventional pollutants (including contaminants leaching from sediments) are now the major limitation to the biological recovery of the GCR/IHC system.

Principle sources of toxic and nonconventional pollutants to the GCR/IHC include industrial contaminants passthrough from municipal wastewater treatment plants, combined sewer overflow (CSO) discharges, potential contributions from groundwater discharge and, to a lesser extent, direct industrial discharges and pollutant cycling from contaminated sediments. Existing environmental/regulatory programs provide a vehicle for control of many pollutant sources and significant reductions in total pollutant loadings have been achieved in recent years.

The purpose of the Master Plan is to provide a management and implementation plan for 1) achieving the maximum control of pollutants possible under existing regulatory programs and 2) developing and implementing such additional control programs as necessary to reduce total pollutant loadings to levels which permit achievement of water uses designated under the water quality standards program.

1.1 ENVIRONMENTAL PROBLEMS

Aquatic Habitat

Historically, the quality of the GCR/IHC as habitat for fish and other aquatic organisms has been severely degraded. Pollutants from industrial and municipal point source discharges have depressed DO concentrations to below the levels necessary to sustain a balanced aquatic community. Also, river sediments have become contaminated with conventional, nonconventional and toxic pollutants, further degrading the quality of the aquatic environment. Finally, man-made changes in the river channel have diminished the quality and quantity of natural habitat areas in the GCR/IHC.

In recent years, significant improvements have been realized in control of industrial and municipal point source discharges of conventional and non-conventional contaminants. As a result, average DO values have returned to levels capable of supporting a balanced aquatic community. Overall, the incidence of water quality standards violations in the GCR/IHC has decreased dramatically since 1977. The number of violations decreased by more than 60%, from 1977 through 1983, in the East Branch. More than a 75% reduction in violations was observed in the IHC during this same period. However, less than a 30% reduction was observed during this same period in the West Branch, which continues to exhibit the most degraded water quality conditions of the GCR/IHC system, based on Indiana State Board of Health (ISBH) monthly monitoring data.

Sediment quality has not significantly improved over the past ten years. Although average concentrations of certain toxic metals have decreased (lead and zinc, in particular), concentrations of other metals have remained roughly constant. Significant levels of oil and grease and organic contaminants persist in the sediments, including PCBs (polychlorinated biphenols), PAHs (polynuclear aromatic hydrocarbons), phenols and other organics. Based on the U.S. Environmental Protection Agency (USEPA) Region V Guidelines for the Pollution Classification of Great Lakes Harbor Sediments, the GCR/IHC sediments are considered heavily polluted for all tested metals except mercury, and polluted to heavily polluted for PCBs. Average mercury levels were near the threshold concentration for classification as polluted.

Wide variations exist between the various sediment contaminants in their bioavailability and the rates at which they are exchanged between the sediments and overlying water column. A preliminary comparison of available sediment contaminants data and established water quality criteria indicated the greatest concern for heavy metals (particularly mercury and cadmium), PCBs, certain PAHs (the two and three membered rings), phenol and bis (2-ethylhexyl) phthalate.

Small natural areas exist along the GCR/IHC which provide habitat for aquatic flora and fauna. Limited field surveys indicate that these areas may be expanding. Emergent vegetation (e.g. cattails) may be restricting movement of sediment deposits.

Biota

Historically, aquatic biota have been depressed in the GCR/IHC, both with respect to species diversity and population density. Only reduced numbers of aquatic earthworms (oligochaetes) were found in benthic samples in the 1960s. The density of oligochaetes increased by a factors of 100 to 4600 in the same areas in a 1973 survey.

In a 1983 fish survey, 16 species of fish were collected in the Indiana Harbor Canal (the River was not sampled during this survey). These results are interpreted as evidence of recolonization of the GCR/IHC, reflecting improving water quality. The potential for bioaccumulation and biomagnification of toxics in aquatic organisms (particularly the benthos) is recognized, but cannot be quantified with the existing data base.

1.2 POLLUTANT SOURCES

Principal pollutant sources include industrial and municipal wastewater discharges, CSOs and non-point runoff. Because industrial and municipal point sources have been subject to regulatory control for over a decade, these sources are the most completely understood. However, until recently, most data from these sources concentrated on conventional and nonconventional contaminants. Little historical data exist from these sources regarding toxics; this data is only now beginning to be collected.

1.2.1 Industrial Point Sources

Based on NPDES (National Pollutant Discharge Elimination System) records at USEPA Region V, seven major industries discharge to the GCR/IHC, including Citgo Petroleum, E. I. duPont, Inland Steel, J&L Steel, U.S.S. Lead Refinery, U.S. Steel, and Vulcan Materials. A number of minor dischargers also exist, including Industrial Disposal, American Steel Foundries, Blaw Knox Foundry and Explorer Pipelines. Of the minor dischargers, Industrial Disposal Company is most significant based on daily loading rates.

Three major dischargers (Inland Steel, J&L Steel and U.S. Steel) account for approximately 90% (by flow volume) of industrial point source discharges to the GCR/IHC, totalling more than 1,000 mgd. These three steel mills, together with DuPont and Industrial Disposal, contribute the bulk of the industrial pollutants discharged.

Because most combined wastewater from the five principal industrial sources is noncontact cooling water, effluent quality is relatively good. Total BOD loading from these sources is very low, relative to discharge volume, especially in comparison with POTW (publicly owned treatment works) discharges.

Industrial outfall monitoring data include conventional contaminants, nonconventional contaminants and a few metals. Sufficient data is only now becoming available to evaluate the toxics loading from the direct discharge industrial sources. In reissuing industrial NPDES permits, Indiana is requiring full analytical testing for toxic organic compounds and is incorporating limits on these compounds in the new permits. Little is known about the biological impacts of toxic constituents in these discharges on the GCR/IHC.

1.2.2 Municipal Wastewater Sources

Three POTWs discharge to the GCR/IHC, representing the Gary, Hammond and East Chicago Sanitary Districts. The Gary plant discharges to the East Branch while the Hammond and East Chicago plants discharge to the West Branch. Due to flow patterns in the West Branch, however, the Hammond POTW effluent enters

that portion of the West Branch draining to the IHC only under certain flow conditions.

Historically, these POTWs have represented major sources of biological contaminants discharged to the GCR/IHC. Recent improvements to these plants have reduced effluent loading rates. Daily BOD loadings from the Gary, Hammond and East Chicago POTWs have been reduced by 32%, 96% and 25%, respectively, from 1968 to 1982.

Comparing 1968 to 1982, total wastewater flows treated by these POTWs have decreased for Gary (by 15%) and increased for Hammond and East Chicago (by 13% and 38%, respectively). These POTWs have traditionally received large quantities of industrial flows from the service areas. However, until recently, effluent monitoring was conducted primarily for only conventional and nonconventional contaminants. All three are currently developing industrial pretreatment programs in response to Federal regulations (40 CFR 403). Influent and effluent sampling conducted in support of pretreatment program development have indicated the presence of toxic compounds, including organics and heavy metals, being discharged to the POTW (full data is not yet available for Hammond).

Tests conducted in February, 1980 on the East Chicago effluent revealed this discharge to be highly toxic to fish and also indicated the presence of mutagenic compounds. Available toxic pollutants data are insufficient to evaluate the relative impacts of the three POTWs on aquatic life in the GCR/IHC.

1.2.3 Combined Sewer Overflows

Fourteen CSOs discharge a combined, estimated total of over 11 billion gallons per year to the GCR/IHC. It is calculated that over 50 percent of the annual CSO volume is discharged to the GCR/IHC within eight miles of Lake Michigan. These outfalls have contributed to fecal coliform contamination of near-shore Lake Michigan.

The water quality impacts of CSOs on southern Lake Michigan are under investigation in a USEPA-sponsored modeling study and, in a more limited way, in an ISBH-sponsored wasteload allocation study.

Both of these studies, however, are concentrating primarily on conventional and nonconventional contaminants and BOD/DO interactions. The impacts of CSOs on water quality and biological habitat, as a result of toxics bypassing, is largely undocumented. However, limited data from one CSO in East Chicago indicate substantial daily loading rates for heavy metals and other toxics (e.g., over 1,000 pounds/day phenol; over 5 pounds/day lead; 3.5 pounds/day nickel and 1.5 pounds/day cadmium). Over 30 industrial discharges to the collection system exist upstream of this CSO.

Insufficient data are available to quantify the CSO impacts on water quality and biological habitat in the GCR/IHC. However, based on the limited POTW influent monitoring data, the CSOs are believed to represent major sources of toxic pollutants to the river.

1.2.4 Non-Point Sources

A variety of non-point sources may contribute to toxic pollutants loading to the GCR/IHC. These include highway runoff; runoff from industrial sites near the river; seepage of contaminated groundwater from dumps, landfills and waste lagoons; rain scour and dust fall; and illegal dumping.

A review of USEPA ERRIS (Emergency Remedial Response Information System) and NPL (National Priority List) file data revealed 38 waste disposal/storage sites ("wastefills") in the GCR/IHC basin of northwest Indiana. Eleven of these sites are within one fifth mile of the river bank; several are essentially on the banks of the river. A number of additional wastefill sites have been tentatively identified by the State and are currently under review.

Limited file data is available for these wastefills. However, it is known that one site (the Gary POTW sludge lagoon) is contributing to PCB contamination of the river. Possible lead contamination is being investigated at another site.

Even less is known about the potential magnitude of other non-point sources (e.g., highway runoff, rain scour, dust fall, etc.). However, based on their number and immediate proximity to the riverbanks, wastefill sites are targeted as the priority non-point sources for further investigation.

1.3 CONTROL PROGRAMS

Existing water quality control programs include NPDES permits for municipal and industrial dischargers, the municipal pretreatment program and the construction grants program. Other control programs, including RCRA (Resource Conservation and Recovery Act) and CERCLA (Comprehensive Environmental Response, Compensation and Liability Act), may also be applied to specific problems.

1.3.1 Water Quality Standards and Industrial Effluent Guidelines Programs

The basis for water quality controls are the water quality standards and effluent guidelines programs. Direct industrial dischargers are required to comply with technology based standards. Industries were required to meet BPT (best practicable control technology currently available) standards by July 1, 1977 and BAT (best available technology economically achievable) and BCT (best conventional pollutant control technology) standards by July 1, 1981.

Where technology based standards are insufficient to meet water quality objectives, such additional treatment as is necessary for compliance with water quality based standards is also required. The need for water quality based standards is evaluated under the State water quality management process (Section 303 of the Clean Water Act [CWA]).

Water quality standards for particular streams consist of a designated use(s) and ambient water quality criteria to protect that use(s). If a State wishes to adopt a use designation other than "fishable/swimmable", a use attainability analysis is required, indicating what the practical limitations are.

The USEPA has promulgated specific procedures which States must follow in developing and revising water quality standards; the Agency reviews the State

programs periodically to ensure compliance. The USEPA provides financial assistance to the States (under Sections 106 and 205 of the CWA) to assist in water quality management and planning. States are required to review and update their water quality standards every three years, at a minimum.

Water quality standards for the GCR/IHC were first promulgated in 1967. The original standards were revised in 1973 and 1978. Following the 1973 revisions, the water quality standards for the GCR/IHC were considered to be comparatively advanced and were effective in achieving substantial water quality improvements in the system. In 1978, the State established a designated use for the GCR/IHC for "...partial body contact, limited aquatic life and industrial water supply." This use designation allows the establishment of water quality standards less stringent than those established for recreational use waterways. However, the CWA requires that stream standards protect downstream uses, and GCR/IHC standards must be adequate to protect the separate standards established for Lake Michigan, Indiana Harbor and the Illinois River.

The State also established an antidegradation policy in 1978. This policy requires that existing instream beneficial uses be maintained and that water quality in streams exceeding the minimum standards be maintained at these higher levels. Limited degradation is permitted only if justified on economic and social grounds.

The State water quality standards for the GCR/IHC, promulgated in 1978, concentrated primarily on conventional and nonconventional parameters. Because these standards were promulgated before the USEPA National Ambient Water Quality Criteria, the numerical standards which were included in the 1978 revisions did not reflect the currently available toxic pollutant criteria. Narrative standards were included, however.

The 1978 use designation did not fully include the "fishable/swimmable" uses specified in Section 101(a)(2) of the CWA. Also, more than three years have elapsed since the last revision to the State standards. Unless the water quality standards are revised to include the Section 101(a)(2) uses, the State must conduct a use attainability analysis, in accordance with USEPA guidance.

If practical limitations exist to attainment of the "fishable/swimmable" uses, these limitations must be identified and an alternative designated use(s) must be specified, as supportable by the results of the analysis. This analysis must also consider downstream water uses. Also, the State should develop and specify the methods to be used for implementing its antidegradation policy (none currently exist).

Because the existing water quality standards are more than six years old, the State must adopt new standards to protect the existing or revised designated uses. These standards must be consistent with the National water quality criteria for toxic pollutants, ammonia, chlorine and DO. Criteria are to be developed based on 1984 USEPA guidelines.

The State may adopt pollutant-specific numerical criteria, narrative criteria or a combination of the two for toxic pollutants. If narrative criteria are adopted in lieu of numerical criteria (which is presently the case for the GCR/IHC), the State should specify the methods which will be used to regulate point sources for control of toxic, persistent or bioconcentrating pollutants.

The State is currently evaluating existing water quality standards through an ongoing wasteload allocation (WLA) study. Effects on Lake Michigan (a downstream water body) are being considered in the WLA effort as well as in another ongoing modelling study, under Federal contract. The results of the WLA study will contribute to revisions of existing discharge limits applicable to the GCR/IHC, currently being developed by the State under the NPDES program.

1.3.2 NPDES Program

The CWA requirements for reduction of point source pollutant discharges are implemented through the NPDES permit system authorized in Section 402 of the Act. NPDES permits have a set lifespan of from several months to a maximum of five years. The permittee must comply with NPDES permit conditions for continued discharge. The permittee must also apply for permit renewal before expiration or in the event of major changes in treatment or manufacturing processes.

Industrial Dischargers

Seven major and four minor industrial dischargers exist on the GCR/IHC, many of which have multiple discharge points. Pertinent data from the seven major dischargers are summarized as follows:

<u>Industry</u>	<u>Flow (mgd)</u>	<u>Date of Most Recent Permit</u>	<u>Scheduled Permit Expiration Date</u>	<u>Compliance in Third Quarter 1984</u>
Citgo	Intermittant	12/14/81	11/30/86	Yes
DuPont	4.70	1/1/79	6/30/81	Yes
Inland Steel	592	3/6/84	2/89	Yes
J & L Steel	154	2/27/81	6/30/81	Yes
U.S.S. Lead	0.06	6/10/75	3/31/80	No (total lead)
U.S. Steel	309	6/1/83	5/31/88	Yes
Vulcan Materials	0.12	8/5/81	7/31/86	Yes

State and USEPA effluent monitoring during the fourth quarter 1984 indicated significant violations of total lead limits at U.S.S. Lead. U.S. Steel was in noncompliance for daily average zinc levels in September, 1984.

Current NPDES permits control primarily conventional, nonconventional and selected other contaminants, including:

- | | |
|---------------------|------------|
| o Oil & Grease | o Ammonia |
| o pH | o Lead |
| o BOD | o Zinc |
| o Suspended Solids | o Cyanide |
| o Dissolved Solids | o Phenols |
| o Chlorides | o Chromium |
| o Fecal Coliforms | o Copper |
| o Chlorine Residual | o Nickel |
| o Fluoride | o Tin |
| o Temperature | o Arsenic |
| o Sulfates | o Mercury |
| o Phosphorus | |

The range of parameters controlled varies widely from outfall to outfall.

Generally, the industrial dischargers have achieved compliance with BPT, BAT and BCT standards and are generally in compliance with existing NPDES permit conditions. However, more information is needed regarding toxics discharged from these facilities and resulting impacts on the biological habitat of the GCR/IHC. Toxicant studies on blast furnaces, coke plants and cold rolling mills have been completed, or are in progress, at steel facilities.

Municipal Dischargers

Three POTWs, representing the Gary, Hammond and East Chicago Sanitary Districts, discharge treated wastewater to the GCR/IHC. Pertinent data from these dischargers are summarized as follows:

<u>POTW</u>	<u>Approx. Flow</u>	<u>Date of Most Recent Permit</u>	<u>Scheduled Permit Expiration Date</u>	<u>Compliance in September 1984</u>
Gary SD	41.4 mgd	7/1/77	4/30/82	No (NH ³)
Hammond SD	37.9 mgd	1/8/79	6/30/83	Yes
East Chicago SD	15.6 mgd	10/15/77	2/2/82	No (NH ³ , Phenol, CN, Fluorides, Chlorides, Sul- fates, O&G, BOD, TSS)

All three POTWs are discharging under expired NPDES permits. New permits will be issued after completion of the WLA.

All three POTWs have experienced chronic problems in meeting NPDES discharge limitations. All have a history of court ordered compliance mandates and consent judgements. The Gary POTW is deteriorating rapidly and suffering from poor operation and maintenance practices. In addition to the NPDES permit, the Gary POTW is regulated by a Federal consent judgement. The USEPA is pursuing enforcement action against Gary for violation of this judgement.

The Hammond POTW has completed substantial plant improvements and has controlled major CSO sources. Sludge handling practices are inadequate and on-site sludge lagoons are at capacity. However, award of a USEPA construction grant to support upgrading of sludge handling facilities and partial emptying of sludge lagoons was made in September, 1981. The POTW is the subject of a USEPA law suit.

The East Chicago POTW has completed major plant improvements, under the terms of a Federal court ordered consent judgment. However, the plant is still unable to meet NPDES discharge limitations. Negotiations are continuing to develop a comprehensive pollutant abatement schedule.

Discharge limitations for the three POTWs control primarily conventional and nonconventional contaminants, including:

- | | |
|--------------------|-------------------|
| • BOD | • pH |
| • Ammonia | • Sulfate |
| • Chlorides | • Fecal Coliforms |
| • Fluorides | • Cyanides |
| • Oil and Grease | • Phenol |
| • Phosphorus | • Flow Rate |
| • Suspended Solids | |

All three POTW's receive substantial industrial flows. However, available data are inadequate to evaluate the degree of toxic pollutants passthrough which may be occurring, or the resulting impacts on the GCR/IHC.

1.3.3 Pretreatment Program

The National Pretreatment Program is described in 40 CFR Part 403. The pretreatment program is intended to protect both the POTW and the receiving waters from harmful constituents included in industrial effluents discharged to the collection system. Specifically, the program prevents the introduction of pollutants which inhibit or otherwise interfere with the treatment works, reduce opportunities for recycle or reuse of sludge, or pass through the plant to receiving waters.

Under pretreatment program regulations, the Gary, Hammond and East Chicago POTWs are required to develop local pretreatment programs: all three receive substantial industrial flows, including industries subject to categorical pretreatment standards, and all treat design flows of over five million gallons per day (mgd).

Although Indiana does not yet have a state approved pretreatment program, an informal draft program application has been made to the USEPA and Indiana has assumed de facto delegation of major program review activities. All three POTWs have been required to prepare pretreatment programs. In response to USEPA orders issued under Section 309 of the CWA, all three POTWs have submitted program applications to the USEPA. These program applications were prepared using USEPA guidance for local pretreatment program development.

All three POTWs have identified industries subject to control and have proposed local limits for discharges to the collection system, based on influent sampling and industrial discharge data. These limits are intended to protect the treatment plant and to prevent pollutant passthrough, which interferes with POTW compliance with Water Quality Standards. The limited constituents are summarized as follows:

<u>POTW</u>	<u>Constituents Limited</u>
Gary	Metals, Cyanide (CN)
Hammond	Metals, CN, Phenols, Oil & Grease (O&G), Mineral or Petroleum origin O&G, PCBs ("no discharge allowed")
East Chicago	Metals, CN, Phenols, O&G, Mineral or Petroleum origin O&G, total Phosphorus (P), Fluoride, Thallium, Methylene Chloride, Fluoranthene, bis (2-ethylhexy) Phthalate

Limited metals include cadmium, copper, lead, mercury, nickel, and zinc for all three POTWs, in addition to chromium for Gary and Hammond, soluble iron for East Chicago, and silver for Hammond and East Chicago. Although additional pollutants (including toxics) are known to be discharged to these POTWs, many of these compounds were not detected in the POTW effluents and were therefore not added to the list of controlled constituents.

The USEPA is currently completing review of the revised POTW pretreatment program documents submitted by East Chicago and is anticipating receipt of revised program documents from Gary and Hammond in early 1985. All three programs are expected to be approved by Summer, 1985. After program approval and implementation, the resultant monitoring of industry and POTW effluents will provide additional data to determine the extent of toxics passthrough to the GCR/IHC. The existing data are marginally sufficient to indicate those toxic pollutants for which additional monitoring is required.

1.3.4 Municipal Wastewater Treatment

The NPDES and pretreatment programs regulate the quality of wastewater effluent discharged from POTWs. The construction grants program (Section 201 of the CWA) provides financial assistance to municipal POTWs for construction of sewerage conveyance and treatment systems to assist in meeting discharge limitations. These funds are provided through the delegated State programs, on the basis of State priorities, and are generally available for planning and design, facilities construction, and personnel training. Grantees are required to comply with general USEPA requirements as well as any additional State or USEPA conditions specific to the POTW.

Since 1970, more than \$108 million in Federal grant assistance has been provided to the Gary, Hammond and East Chicago POTWs. Overall, the progress of facilities planning for all three POTWs has been slow; despite the more than 10 years since these municipalities initiated participation in the 201 program, substantial program elements have yet to be completed.

Six major grants have been received by Gary, for planning, construction and operator training. Facilities planning has been concluded and all elements of the plan have been approved except solids handling and disposal, which remains as the weak point in the overall sewerage collection, transport and treatment system. Gary has applied for \$30-40 million in grant assistance for improvements to the sludge handling system. However, the USEPA has denied this request because the proposed solution was not found to be cost effective and failed to address the issue of PCB-contaminated sludge in the Ralston Street lagoon.

Facilities planning in Hammond is also essentially complete. Construction of the advanced wastewater treatment (AWT) facilities is complete and has resulted in 95 percent reductions in BOD and solids loading to the GCR/IHC. A CSO study is under review by the State. This study recommends full sewer separation. Evaluation of CSO impacts on water quality is underway.

East Chicago has experienced chronic problems in completing facilities planning activities. Progress has been minimal and those reports and plans which have been completed have been found to be seriously deficient by the State and USEPA. The Infiltration/Inflow (I/I) analysis is the only facilities planning element which has been approved. The Sewer System Evaluation Survey (SSES) report and a facilities plan segment addressing rehabilitation of the existing plant were returned due to major deficiencies. An estimated \$35 million is required to meet wastewater treatment needs through the year 2000, for renovation of existing primary and secondary treatment units, addition of AWT facilities and renovation of sludge management facilities. Progress toward completion of facilities planning has been suspended while East Chicago selects a new consultant. While no plans for CSO control presently exist, the need for such controls is being re-evaluated by the USEPA.

2. RECOMMENDATIONS

Water quality in the Grand Calumet River/Indiana Harbor Ship Canal (GCR/IHC) has improved dramatically in the past 10-15 years, however, improvements in the West Branch have been more limited. Dissolved oxygen levels were once too low to support any but the most pollution tolerant aquatic species, and even these organisms were greatly reduced in numbers. Today, average DO levels are adequate to support a varied species assemblage of freshwater fish and other aquatic organisms, and recent data suggest that some recolonization of the GCR/IHC has begun.

Significant reductions in point source pollutant loading rates have been achieved through both municipal and industrial effluent controls. These controls have focused on regulation of conventional and non-conventional contaminants, which are closely related to DO levels in the receiving water. As these pollutants have come under increasing control, the potential importance of toxic pollutants to the water quality and aquatic habitat of the GCR/IHC has become more apparent.

In recognition of the above, the following recommendations have been formulated in order to:

1. Continue the existing emphasis on pollutant controls.
2. Clarify the role of toxic pollutants in the river system.
3. Develop any additional toxic pollutant control programs that are necessary for restoration of the GCR/IHC.

These recommendations will be implemented through a cooperative, interagency effort which will be directed and sustained by EPA. The following recommendations have been developed pursuant to a thorough review of existing water quality and aquatic habitat problems in the GCR/IHC, to the extent practical with the existing data base.

2.1 ADMINISTRATIVE AND PLANNING RESPONSIBILITIES

Improving water quality in the Grand Calumet River will require the sustained efforts and cooperation of a least seven public and regulatory

agencies. The Master Plan recognizes the importance of utilizing the scientific expertise of the various agency staff members. Successful implementation of Plan recommendations will require administrative coordination between these agencies. This will minimize the procedural delays associated with development and implementation of additional control programs and will facilitate more effective use of existing controls. Key agency roles are discussed below.

U.S. ENVIRONMENTAL PROTECTION AGENCY

The USEPA will continue with preparation of the Master Plan to final draft. The USEPA will encourage implementation of recommendations by responsible agencies, particularly with respect to Indiana, which has been delegated authority for the construction grants and NPDES permit issuance programs. Emphasis will be placed on USEPA and State enforcement of existing regulations and completion of studies in progress. The USEPA will stress full implementation of existing programs as a basis for new control programs. Field studies will be undertaken as required to support control programs. The USEPA will assume the lead role in coordinating interagency implementation of the final Master Plan and will designate a key contact individual to manage and monitor plan progress. In addition, the USEPA will work closely with the State and will cooperate with and support applied research programs and field investigations of other agencies pursuant to establishment of new control programs.

INDIANA STATE BOARD OF HEALTH

The ISBH will play a major role in implementation of the final Master Plan. Through management of the Federal regulatory authorities delegated to the State of Indiana, the ISBH plays a key role in management of the environmental resources of the Grand Calumet. The State has primary responsibility for revising water quality standards, wasteload allocations, and NPDES permits. The ISBH will also closely coordinate with the USEPA in completion of pre-treatment programs for the Gary, Hammond and East Chicago POTWs. The ISBH should also designate a key contact person.

U.S. ARMY CORPS OF ENGINEERS (COE)

Completion of the Environmental Impact Statement (EIS) on Indiana Harbor project maintenance dredging is an essential step toward implementation of the Final Master Plan. The COE assessment of alternatives to dredging and spoils disposal from the Harbor and Ship canal will contribute to public and Agency perceptions of the feasibility of remedial actions proposed for upriver sediment contamination. In addition, the COE is performing a special investigation to consider control alternatives for the most highly polluted areas of the IHC. As part of this effort, the COE will investigate the overall relationship between contaminated sediments and water quality in the GCR/IHC, as well as effects on near-shore Lake Michigan. The USEPA will cooperate with the COE in these efforts, with the intention of applying study results to the consideration of control alternatives for areas of contaminated sediments upstream of the COE dredging project.

U.S. GEOLOGICAL SURVEY (USGS)

The USGS has a high degree of interest in establishing a flow monitoring program for the East and West Branches of the GCR, in cooperation with the ISBH and USEPA. Data will be used to refine existing water quality models and to support continued pollutant monitoring and dispersion analyses.

OTHER AGENCIES

The following agencies have been invited to review and comment on the draft and final Master Plan. These agencies may contribute to determining priorities, assessing the feasibility of proposed remedial actions, and evaluating new regulatory approaches and standards for the Grand Calumet River.

- U.S. Fish and Wildlife Service
- Indiana Department of Natural Resources
- Northwest Indiana Regional Planning Commission (NIRPC).

The NIRPC has exhibited a strong interest in assuming a continuing role in addressing water quality issues in northwest Indiana. The Master Plan has

been made available to other interested agencies, in addition to those discussed above.

2.2 COMMUNITY INVOLVEMENT IN PLANNING AND IMPLEMENTATION

PUBLIC INTEREST GROUPS

The Lake Michigan Federation, the Grand Calumet Task Force, and other public interest groups have been (and will continue to be) invited to attend public information meetings and comment on research findings, proposed technologies, and overall Master Plan recommendations and conclusions. A mailing list has been prepared for public interest groups. A public information meeting was held in October 1984 to announce completion of the Plan.

INDUSTRY ASSOCIATIONS AND CHAMBERS OF COMMERCE

Master Plan recommendations will be distributed to these groups by the USEPA. A contact person at the Agency and at the ISBH will be identified. It is anticipated that the major items of interest of these groups will be the schedule for implementation of industrial wastewater pretreatment regulations and any revisions to NPDES permits.

SANITARY DISTRICT RESIDENTS

Conclusions and recommendations regarding municipal wastewater collection and treatment facilities, and especially regarding proposed CSO controls or impending enforcement actions, will be described in the Master Plan. Plan recommendations will be distributed to the Sanitary District offices of Gary, Hammond, and East Chicago. Local residents should monitor plan implementation.

2.3 WATER QUALITY STANDARDS AND INDUSTRIAL EFFLUENT GUIDELINES PROGRAMS

Need

The existing water quality standards for the GCR/IHC are overdue for revision and updating, based on the requirements of the Clean Water Act (CWA). Also, the designated uses of the GCR/IHC (which the criteria and standards are developed to protect) do not include the full range of uses possible under the CWA.

Recommendations

It is recommended that:

- The ISBH 1) adopt the "fishable/swimmable" goals of Section 101(a)(2) of the CWA, or 2) conduct a use attainability analysis, pursuant to Section 131.10 of the Act, and adopt the resulting appropriate use designation. Such an analysis be conducted pursuant to the 1983 USEPA publication: Water Body Survey and Assessment Guidance for Conducting Use Attainability Analysis. Practical limitations to the attainment of the "fishable/swimmable" goals of the CWA be identified and that an alternative, designated use be proposed, consistent with the result of the use attainability analysis.
- The ISBH adopt water quality criteria protective of the designated use. Such criteria be derived pursuant to USEPA draft guidelines published (49 FR 4551) in February 1984. Such criteria include conventional, non-conventional and toxic substances (including the Section 307(2)(1) priority pollutants). Criteria be either pollutant-specific, narrative, or a combination of the two. If narrative criteria are adopted, these be developed pursuant to Section 131.11(2) of the Act and include specifics to describe the methods proposed by the ISBH to regulate point source discharges of toxic substances.
- The ISBH propose new water quality standards for the GCR/IHC based on the above. Such analyses consider an accelerated schedule for standards upgrading for those portions of the system already exhibiting elevated water quality conditions (e.g., the Marquette Park Lagoons).
- The ISBH augment the wasteload allocations for point source discharges presently being completed to include toxic pollutants.
- The ISBH revise its antidegradation policy, pursuant to Sections 131.6(d) and 131.12 of the Act. This policy identify proposed methods for protecting the instream uses designated pursuant to Section 101(a)(2) of the Act, or a use attainability analysis, as described above.

Status

The Indiana Stream Pollution Control Board is currently evaluating the possibility of changing the GCR/IHC use designation from limited aquatic life, industrial water supply, and partial-body contact recreation to aquatic life and whole-body contact recreation, pursuant to the recommendations of the Grand Calumet Task Force. The Board is also considering changing the total ammonia standard to un-ionized ammonia, expanding the number of toxic parameters included under the regulation, and updating the fecal coliform

standards. The results of the nearly completed WLA are being considered in these evaluations. The chloride, sulphate, and total dissolved solids standards are also being reevaluated, especially as regards impacts on Lake Michigan.

A public hearing on the proposed revision process will be conducted, in northwest Indiana, in early 1985. Limited standards revisions are expected to be adopted in mid-1985. The State then intends further review of water quality standards, with emphasis on toxicants.

2.4 NPDES PROGRAM

Need

Historically, NPDES permit limits were based primarily on conventional and nonconventional contaminants as well as selected metals and other pollutants. These permits did not generally include provisions for control of toxic pollutants.

Recommendation

It is recommended that:

- In reissuing industrial NPDES permits, full analytical testing for toxic organic pollutants continue to be required for sources whose wastewater is suspected of containing these pollutants. Appropriate limits are being included in the new permits.
- The State and USEPA perform biomonitoring at the Gary, Hammond and East Chicago POTW outfalls. Biomonitoring also be performed at selected outfalls among the seven major industrial point sources (Citgo, duPont, Inland Steel, J&L Steel, U.S.S. Lead, U.S. Steel and Vulcan Materials) as part of Indiana and USEPA's joint, long-term biomonitoring program. Biomonitoring results be used as a screening test to determine the need for revisions to NPDES permit limits for control of specific toxic substances. Revisions to POTW limits be implemented through the NPDES program.
- The USEPA cooperate with the ISBH to ensure that the U.S.S. Lead Refinery comply with the NPDES permit conditions.
- The ISBH and USEPA ensure implementation of NPDES requirements for POTW pretreatment program development, pursuant to 40 CFR Part 403, for the Gary, Hammond and East Chicago Sanitary Districts.

- The Gary NPDES permit be reissued to reflect effluent limits specified in the wasteload allocation analysis. This new permit include requirements for proper operation and maintenance of existing POTW facilities, establishment of a replacement fund and correction of sludge handling and storage deficiencies.
- The Hammond NPDES permit be reissued to reflect effluent limits specified in the wasteload allocation analysis. This new permit include requirements for completion of sludge handling equipment construction.
- The East Chicago NPDES permit be reissued to reflect effluent limits specified in the wasteload allocation analysis. This new permit include requirements for construction and operation of sludge handling facilities.
- Under the NPDES program, a comprehensive CSO program be implemented; dry weather discharges from CSO outfalls be eliminated. CSO frequency be minimized through maximizing the efficiency of existing POTW facilities. Controls be established for CSO outfalls which require them.
- Toxic pollutants monitoring may be required for selected CSOs, based on water quality data and the nature of the industrial discharges contributing to the collection system upstream of the CSO.

Status

All major industrial discharger NPDES permits have been reissued, except those for duPont, Jones and Laughlin and U.S.S. Lead, which have been public noticed (for intent to reissue) and are expected to be reissued by Summer, 1985. The three POTW permits are subject to the conclusions of the nearly completed WLA, but are also expected to be reissued by Summer, 1985. Effluent monitoring and biomonitoring are scheduled for U.S.S. Lead, the Gary Sanitary District and the East Chicago Sanitary District during 1985. Effluent monitoring is scheduled at Inland Steel, also in 1985.

2.5 PRETREATMENT PROGRAMS

Need

A wide variety of industrial facilities discharge process wastewaters to the Gary, Hammond and East Chicago POTWs. These wastewaters contain toxic pollutants which may pass through the POTW and be discharged to receiving waters. Also, these pollutants may be displaced in the POTW sludge in sufficient concentrations to restrict sludge recycling or reuse opportunities, or

may result in environmental contamination as a result of sludge disposal practices.

Recommendations

It is recommended that:

- o The ISBH cooperate with the USEPA to effect the early completion and implementation of municipal pretreatment programs for the Gary, Hammond and East Chicago POTWs. These programs be consistent with 40 CFR Part 403 regulations as well as State guidance.
- o After pretreatment program development and implementation, POTWs monitor for toxic pollutant pass through. Sludge be analyzed for priority pollutants and other toxics, as necessary. Effluent biomonitoring tests be conducted to determine the possible presence of toxic pollutants in the final effluent. Pretreatment and effluent limits be revised, following industrial discharge monitoring and biomonitoring of the municipal effluent, to control pass-through pollutants, protect treatment operations and enhance sludge disposal opportunities. Pretreatment program monitoring and control needs be implemented through the NPDES program.

Status

East Chicago has submitted revised program documents to the State and USEPA. Revised programs are expected to be submitted by Gary and Hammond in early 1985. Program approval for all three POTWs is anticipated by fall, 1985, based on current progress. Municipal pretreatment programs will include time schedules for implementation of various monitoring requirements. Effluent biomonitoring is being performed by the USEPA and State.

2.6 MUNICIPAL WASTEWATER TREATMENT PROGRAM

Need

Since 1970, more than \$108 million in Federal grant assistance has been provided to the Gary, Hammond and East Chicago Sanitary Districts for planning, construction and operation of wastewater treatment facilities. Although significant progress has been realized, existing facilities are inadequate to ensure consistent control of municipal effluent, for protection of the receiving water. Poor management and operation of facilities also exists in some instances.

Recommendations

It is recommended that:

- o The USEPA work with the Gary Sanitary District and the Indiana State Board of Health to ensure compliance with the existing consent decree regarding sludge handling, Ralston Street Lagoon cleanup, operator training and operation maintenance.
- o The USEPA work with the Hammond Sanitary District and the ISBH to ensure complete construction of necessary sludge management facilities. Hammond provide a study which effectively evaluates cost-effective CSO control alternatives.
- o The USEPA work with the East Chicago Sanitary District and the ISBH to ensure complete facilities planning, construction of short-term and long-term sludge handling facilities, and other requirements needed to achieve compliance with the NPDES permit. East Chicago determine the need for additional controls by performing the revisions to its CSO study requested by the USEPA.

Status

A construction grant has recently been awarded to Gary for plant operator training. Hammond was awarded a grant for solids handling facilities in September, 1984. East Chicago has retained an engineering firm (TenEch Environmental Engineers) to complete the facilities planning process.

The USEPA is pursuing an enforcement action in response to continuing violations of Gary's consent judgment. In Hammond, a consent judgment is under negotiation. East Chicago has been subject to several court orders previously; the USEPA anticipates negotiation of a consent judgment as the next step toward permit compliance.

2.7 CSO CONTROLS

Need

CSO outfalls discharge an estimated 11 billion gallons of raw wastewater to the GCR/IHC, on an annual basis. These CSO discharges may include significant quantities of toxic pollutants from industrial discharges contributing to the sewer system upstream of CSO overflows.

Recommendations

It is recommended that:

- o The ISBH and USEPA evaluate the need for additional CSO controls on the basis of the wasteload allocation program and the current evaluation study of CSO impacts on water quality in near-shore Lake Michigan. These evaluations focus primarily on the need to control conventional and nonconventional contaminants.
- o The ISBH and USEPA identify additional data needs to determine the impacts of CSO toxics loading on near-shore Lake Michigan, on the basis of the modeling study currently underway. These needs be coordinated with the future toxics WLA modeling process.
- o Under the NPDES program, dry weather CSO overflows be eliminated, infiltration be reduced, inflow be retarded and existing POTW facilities be managed to achieve maximum reduction of CSO overflow events.
- o Additional CSO control needs be identified through the NPDES program.
- o The USEPA require the Cities of Gary, Hammond and East Chicago, as part of their pretreatment programs, to strictly enforce local sewer use ordinances to control the introduction of toxic industrial pollutants to portions of the sewer system subject to CSO discharges.

Status

The USEPA is currently developing a CSO policy position, which will guide the development of CSO permits. This policy document will clarify funding priorities for CSO projects and will assist in planning and implementation of additional CSO controls and permits. Completion of the CSO policy is anticipated in mid-1985.

2.8 NON-POINT SOURCE CONTROLS

Need

Non-point source pollutant loading to the GCR/IHC derives from a variety of potential sources, including contaminated sediments, highway runoff, rain-scour, dustfall, seepage of contaminated groundwater and surface runoff from industrial properties contiguous to the river. The most significant sources are currently believed to include contaminants released from sediments, direct runoff from facilities contiguous to the river and contaminated groundwater seepage.

Recommendations

It is recommended that:

- o The USEPA coordinate with the Indiana State review of ERRIS and NPL waste storage and disposal sites in the GCR/IHC basin. The USEPA explore, with the State of Indiana, alternatives for assigning priority to a coordinated investigation of the wastefill sites located within 1/5 mile of the river. The review of groundwater issues at individual sites be coordinated to enhance the utility of data collected in other efforts. Regulatory action under RCRA, "Superfund," NPDES or other applicable regulatory mechanisms will be pursued where appropriate.
- o The USEPA cooperate with the COE-sponsored investigation of alternatives for control of contaminated sediments in two areas in the harbor maintenance dredging zone. (This COE investigation has begun and is centering on two areas of the river exhibiting high levels of sediment PCBs. This study is including an investigation of the overall interaction of sediment contaminants and water quality in the GCR/IHC system. These investigations are being performed by the COE's Waterways Experiment Station.)
- o Following additional data acquisition, based in part on the COE efforts referenced above, USEPA investigate alternatives for remedial action for contaminated sediments in the GCR/IHC system, upstream of the navigation channel.
- o The USEPA cooperate with Indiana and the USGS to establish a flow monitoring program on the GCR/IHC. This program include consideration of groundwater contributions and be coordinated with the priority investigation of wastefill sites. The resulting flow data be utilized in pollutant dispersion monitoring and modeling activities.

Status

Several of the ERRIS sites are currently under investigation by the State, but a coordinated investigation of ERRIS listed sites in the GCR/IHC basin has not yet been initiated. Investigations should be completed in 1986. The COE study of alternatives for control of contaminated sediments in the IHC has been initiated. Stage 1 of this study will be completed in 1985. Data generated in the COE investigations will contribute to the investigation of alternatives for control of contaminated sediments in upstream areas, which will be performed in 1986. The USEPA is considering a program for the advance identification of disposal sites, as a follow-on to the nearly completed COE draft EIS for disposal of dredged harbor sediments, to be conducted in late 1985. The cooperative USGS/Indiana/USEPA flow monitoring program study has been initiated.

2.9 MONITORING AND SURVEILLANCE

Need

Existing control programs and strategies are oriented toward those pollutant sources which are best understood and for which at least preliminary data exist. As the existing and new proposed control programs are implemented, the relative magnitudes and importance of various pollutant sources will change. Long-term monitoring is necessary to evaluate the effectiveness of control programs and to discover any remaining, uncontrolled contaminants sources of significance.

Recommendations

It is recommended that:

- The State and USEPA conduct fish flesh contaminant monitoring for toxics, as an indicator of bioaccumulation. Also, toxics monitoring be conducted at representative locations in the GCR/IHC.
- The USEPA cooperate with the ISBH, USGS, and COE to develop a coordinated monitoring effort for groundwater, surface water and sediment quality, as regards known contaminant sources and concentrating on toxic pollutants and resolving uncertainties in flows and loads.
- The USEPA and ISBH develop a long-term monitoring plan for specific target pollutants, to be implemented by individual agencies under existing monitoring programs. Data from all sources be provided to the State for collating. This data will be instrumental for development of a toxics WLA system and other future modelling efforts.

Status

The State and USEPA have initiated a fish flesh contaminant monitoring program and have collected preliminary samples for analysis. An initial study, conducted by the State and USGS to resolve uncertainties in flows and loads, was conducted in October, 1984. A coordinated USEPA/COE/USGS/ISBH multimedia monitoring program has not yet been developed. An interagency task force is being formed, comprised of Federal and State agencies, to develop a long-term program for monitoring of target pollutants.

2.10 WASTELOAD ALLOCATION

Need

Many of the preceding recommendations have been directly or indirectly related to the ongoing WLA modelling effort. This model, when complete, will provide a basis for regulating the discharge of primarily conventional and nonconventional contaminants to the GCR/IHC. However, as the role of toxic pollutants in the GCR/IHC becomes more clearly understood, a similar allocation mechanism will be necessary for the effective control of toxics.

Recommendations

It is recommended that:

- The USEPA coordinate with the State to implement such additional studies as are needed to empirically define the relationship between point and non-point sources of toxics and the resulting impacts on water quality, sediments and aquatic biota. Such studies include impacts on Lake Michigan and biological risk assessment evaluations.
- The USEPA support the development of a toxics WLA model as a basis for establishing discharge limits in future NPDES permits. This model include point and non-point sources of pollutants; consider impacts on water quality, sediments, aquatic biota and downstream water bodies; be developed as an extension of the current WLA; and be based on updated hydrologic and pollutant source data developed as results of the preceding recommendations.

Status

A WLA study, including the contaminants regulated by existing water quality standards, is nearing completion. A modeling study of CSO impacts on water quality in near-shore Lake Michigan is also nearing completion. When complete, the results of both investigations will be utilized in determining the additional data needs to support development of a toxics WLA.

2.11 INSTITUTIONAL

Need

Comments from residents of Northwest Indiana have indicated a strong interest in the establishment of a regional or field office of the ISBH in the

area. A need for such an office is perceived in order to provide for more effective communication between area residents and the State, as well as to enable more timely and effective response to environmental problems.

Recommendations

It is recommended that:

- The ISBH, through an arrangement with local agencies or other means, provide for an expanded local presence to act as a focus for more effective communication with the citizens of northwest Indiana, for all environmental media.

Status

The State Environmental Policy Commission has recommended the establishment of a regional office in northwest Indiana to better respond to local concerns. This recommendation is under review by the Governor. The State is considering an arrangement whereby the NIRPC would function as a local liaison office for the State Board of Health.

2.12 TIME FRAME AND IMPLEMENTATION

Figure 1 presents time bands in which activities recommended in the Master Plan and other ongoing activities are targeted. It is important to note that events may occur which result in delay or acceleration of the recommended activities. For example, a newly discovered problem pollutant or problem pollutant source could require immediate investigation, shifting resources and time frames for other activities.

Implementation of the Master Plan will be closely monitored and the subject of periodic meetings and reports by the agencies involved. Details of planned activities will be presented in the annual program plans by the State. Members of the public may participate by comment on the State's program plan, by comment at public hearings, and by response to public notices on such matters as proposed permit revisions and water quality standards.

Comments on the report or on the issues raised may be made at any time to the following address:

Director, Water Division
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, IL 60604

Figure 1. Projected Time Frame for Implementation of the Grand Calumet Master Plan

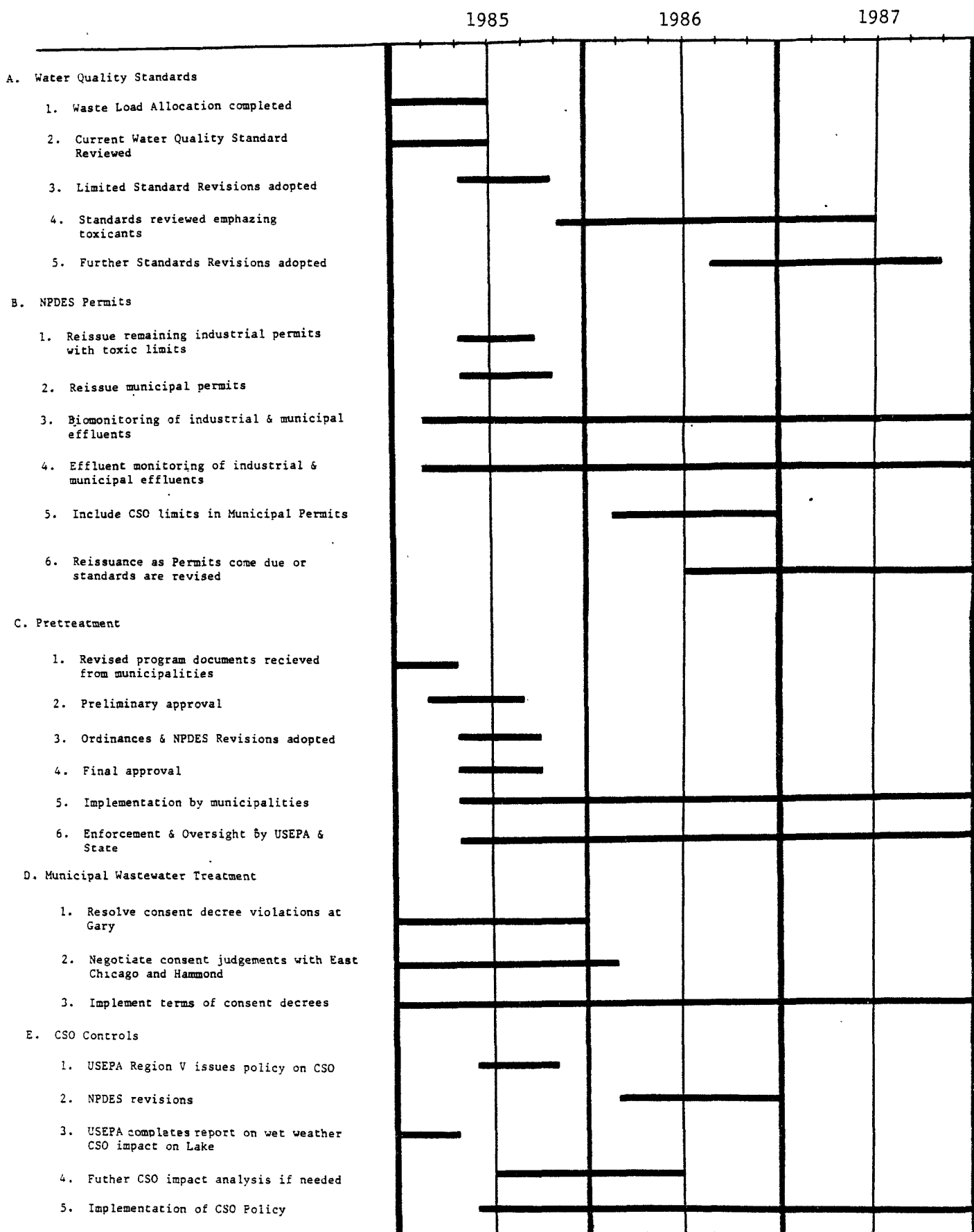


Figure 1. (continued)

