

MICHIGAN

COMBINED SEWER OVERFLOW CONTROL PROGRAM MANUAL

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**Michigan Combined Sewer Overflow
Control Program Manual**
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I. Introduction and Objectives

Combined sewer overflows (CSOs) are a serious environmental concern in many areas of the State. Combined sewers are sewers designed, constructed and operated to carry both sanitary sewage and storm water runoff. Combined sewer systems usually include devices (often called regulators) that are designed to divert sanitary sewage mixed with storm water to a river, stream, or lake during periods of wet weather. Most of the time all sanitary sewage and minor amounts of storm water are directed to a wastewater treatment facility. Only during wet weather events, when flows exceed the capacity of the sewer, sewage and storm water overflow to the surface waters. This discharge is known as a CSO. Sometimes the structure itself is referred to as a CSO.

Michigan's Water Quality Standards were updated in 1986 and 1994. The 1986 amendments included protecting all waters for total body contact recreation and increased the dissolved oxygen standard. The 1994 amendments essentially require that all discharges containing treated or untreated sewage be disinfected. CSO control programs have been required through the National Pollutant Discharge Elimination System (NPDES) permit program beginning in 1988. These permits require development of programs to protect the public health, to eliminate the discharge of raw sewage, and to comply with the Water Quality Standards. Implementation of these CSO Control Programs will be or are required through reissued NPDES permits. All control programs will need to comply with the Water Quality Standards, including the amendments.

The Michigan Department of Natural Resources (MDNR) and the Water Resources Commission (MWRC) adopted the Michigan State-Wide Combined Sewer Overflow Permitting Strategy in January 1990 (see Appendix A). This strategy, which called for establishment of enforceable deadlines for CSO control, will lead to the elimination or adequate treatment of all CSOs in Michigan. NPDES permits containing schedules for development of corrective programs have been issued for nearly all CSOs. Each permit was issued on a case-by-case basis resulting minor changes in permit language (See Appendix B for sample permit language). This regulatory approach regarding CSOs was intended to provide flexibility for individual communities to develop site-specific corrective programs.

The Michigan State-wide CSO Permitting Strategy is a phased approach. Phase I required operational improvements of the existing system to minimize overflows, sampling and other monitoring conditions to establish a strong data base on the existing system, and construction of interim CSO control projects where feasible. Under state statute, all CSO communities are required to notify the MDNR, local health departments, and local newspapers whenever there is a CSO discharge to surface waters. The local health department will issue advisories if needed. This statutory requirement is included in the NPDES permit as a part of Phase I. Phase I also requires development of a final program leading to elimination or adequate treatment of CSOs. The final program must contain a fixed-date schedule to achieve the maximum feasible progress in accomplishing these corrections, taking into account technical and economic considerations.

Phase II is the implementation of the final program in subsequent NPDES permits. The schedule developed under Phase I has been or will be incorporated into the NPDES permit, and the permittee will be required to proceed with implementation. The permits require that final programs provide for elimination or adequate treatment of CSOs. This will be accomplished on a case-by-case basis with professional staff of the department working closely with municipalities to define appropriate corrective programs.

The United States Environmental Protection Agency (EPA) issued a national policy on CSO control on April 19, 1994 (See Appendix C). MDNR staff were involved with EPA policy development process and the resulting policy is substantially consistent with the Michigan program.

II. Legal Effect of This Manual

This manual is intended to be a communication tool between Agency Management and Agency Staff. This manual, does not carry the force nor effect of law. It does not affect the rights of, or the procedures and practices available to, the public. This manual does not have general applicability applying law. While it does describe a plan which the agency has followed and intends to follow, it does not bind the agency nor any person in any way. The application of the Water Quality Standards and other requirements of law, such as the NPDES permit program, shall be by established practices and procedures. This document and matters addressed herein are subject to revision without notice.

III. Permitting Priorities

CSO permit actions were taken considering the following priorities:

1. Reissuance of major permits for facilities with CSOs planned for reissuance during the Fiscal Year.
2. Reissuance or modification of miscellaneous high priority CSO permits identified by the District Offices.
3. Incorporation of approved CSO Programs requiring implementation.
4. Reissuance of all other expired permits for untreated CSOs.
5. Termination of CSO permits where CSOs have been eliminated.
6. Reissuance of all expired permits for CSO facilities which have existing treatment.

IV. Permit Issuance

All CSOs tributary to a single treatment works and under the administrative control of a single entity are permitted under a single NPDES Discharge Permit. The operator of the outfall sewer from which sewage enters the waters of the state is generally assumed to be the entity with administrative control and is therefore the permittee. This entity is not necessarily the local unit of government in which the outfall is located or the local unit of government generating the wastewater. In some cases, a county agency, a sewer authority, or a drainage board is the permittee where they operate sewerage systems and have administrative control of the outfall sewer. It is fully expected that appropriate contractual or other arrangements will be made between the permittee and other entities responsible for combined sewage flows tributary to CSOs to ensure full implementation of permit required corrective programs.

CSOs are point sources subject to NPDES permit conditions including both technology-based and water quality-based requirements of the Clean Water Act. CSOs are not subject to secondary treatment regulations applicable to publicly owned treatment works. All CSO permits must immediately require controls consistent with best available technology economically achievable (BAT) and best conventional technology (BCT). BAT/BCT control levels are established on a case-by-case basis by the permitting authority based upon best professional judgment (BPJ). Water quality-based conditions are to be established based on applicable water quality standards.

V. Phase I Permit Conditions

Phase I conditions in CSO permits were established to be consistent with state and federal law:

A. Minimum Technology-Based Requirements (BAT & BCT, based on BPJ)

1. Proper operation and regular maintenance of the sewer system and combined sewer overflow points;
2. Maximum use of the collection system for storage;
3. Implementation of pretreatment programs to assure CSO impacts are minimized;
4. Maximization of flow to the treatment facility;
5. No dry weather overflows;
6. Control of solid and floatable materials where required;
7. Consideration of pollution prevention programs to reduce contaminants;
8. Notification of MDNR, local health departments, and local newspapers in accordance with approved procedures; and
9. Implementation of an approved monitoring program.

B. Other Phase I Conditions

1. Designation of an operations and maintenance manager for the collection system and CSOs;
2. Immediate actions to reduce, control, and monitor CSOs;
3. Development and implementation of an operations and maintenance plan;
4. Preparation of a detailed CSO report;
5. A long term CSO monitoring program;
6. Development of an approvable Final CSO Control Program which shall contain fixed date milestones resulting in the maximum progress feasible for elimination or adequate treatment of combined sewage discharges to comply with the Water Quality Standards at times of discharge; and
7. Construction of CSO control or related projects which are feasible and consistent with the Final CSO Control Program.

The Final CSO Control Program (see item B.6 above) must assure compliance with state law and standards through the elimination or adequate treatment of CSOs. Adequate treatment will be determined on a case-by-case basis with staff of the MDNR working closely with municipalities in defining the necessary and appropriate correction programs. The degree of treatment required at any particular location shall protect the designated uses of the receiving stream and meet the Water Quality Standards at times of discharge. As a minimum, the treatment must assure adequate floatable and settleable solids removal and adequate disinfection.

It is recognized that it is difficult to establish detailed case-specific effluent limitations for treated CSO discharges based on the water quality standards. In the absence of sufficient site-specific information upon which to define site-specific adequate treatment, the following would generally be considered adequate treatment:

- retention, for transportation and treatment at the wastewater treatment plant, of combined sewage flows generated during storms up to the one-year, one-hour storm,
- primary treatment of combined sewage flows generated during storms up to the ten-year, one-hour storm (thirty minutes detention or equivalent for settling, skimming, and disinfection), and
- treatment of combined sewage flows generated during storms in excess of the ten-year, one-hour storm to the extent possible with facilities designed for lesser flows.

Where this adequate treatment definition is used in a permit, the discharger is provided an opportunity for a case-specific demonstration that alternative facilities will achieve equivalent or better treatment and control or that an alternative level of protection is adequate or necessary to achieve the water quality objectives. Both demonstration opportunities are available. Demonstrations must consider 1) receiving stream characteristics, 2) discharge characteristics, 3) cost / benefit information and 4) designated uses. Demonstrations may consider providing a high degree of treatment at high volume, high pollutant outfalls and a lesser degree of treatment at smaller volume or dilute outfalls.

Permits require (see item A.8 above) that the permittee notify the MDNR, local Health Departments and newspapers of CSO discharge events in accordance with formal notification procedures approved by the District Supervisor. The notification procedures will be updated as facility modifications are made to allow better information to be obtained. MDNR will consult with local Health Departments regarding the issuance of health advisories in situations where CSOs or other discharges may disrupt a downstream use.

Permits also require (see item B.5 above) that a fully adequate monitoring program be developed and implemented according to a fixed date schedule. The program is to:

1. Document the rainfall, and the frequency and the duration of all discharge events,
2. Estimate the volume and quality of discharges, and
3. Determine the potential discharge of pollutants attributable to significant industrial users at each CSO outfall.

VI. Phase II Permit Conditions

A. Final CSO Control Program

As Final CSO Control Programs are submitted to and approved by the District Offices, the NPDES permit will be modified or reissued to incorporate the programs as enforceable conditions. Phased construction projects may be included in the Final CSO Control Program, so permit conditions may include modifying, updating, or expanding previously approved Phase I conditions. The Final CSO Control Program conditions are expected to be exactly as approved by District Staff, but the permit must consider input from other staff, the permittee, and the public.

B. Compliance Schedules

Phase II permits will contain compliance schedules to accomplish maximum feasible progress in meeting the CSO objectives, taking into account technical and economic constraints. Selected milestone dates from the Final CSO Control Program and other significant conditions will be included as permit compliance dates. Other schedule dates that are included in the Final CSO Control Program are also enforceable, however, District Staff may approve modification of those dates without the need for a permit modification. Permits will require continued compliance with the minimum technology based requirements. These requirements are defined in item V.A. above.

VII. Additional Phases

Where the CSO correction program is particularly large and complex, additional Phases may be established. For example, in the Rouge River Basin in Southeast Michigan, an interim phase was established between Phase I and Phase II, with the objectives of elimination of raw sewage and public health protection.

VIII. Application of Water Quality Standards During Wet Weather

The Michigan Water Quality Standards apply at all flows greater than the lowest monthly 95% exceedance flow. Therefore the Standards apply during wet weather. At this time, no changes to the Standards are anticipated to modify applicability during wet weather.

IX. Funding of CSO Correction Projects

Michigan administers the State Revolving Fund (SRF) which provides low interest loans for sewage treatment works, including CSO control. In accordance with Section 201 (n)(1) of the Clean Water Act, Michigan is authorized to fully use the SRF to assist the correction of combined sewage overflows. (Communities with combined sewer overflows have been notified of the State's CSO initiative and permits are being issued requiring communities to develop programs to provide adequate control and/or treatment.) Communities which adequately fulfill the SRF requirements will be eligible for low interest loans for CSO Projects. Schedules for corrective programs are not, however, to be developed on the availability of state or federal financial assistance.

X. Procedures to Encourage State-Wide Uniformity

A. Criteria for approval

1. Final CSO Control Program

The overall objective of this Plan (see I. Introduction and Objectives) must be achieved by the permittee's proposed Program to be approvable. That is, the Program must either eliminate or "adequately treat" all CSOs to ensure that discharges will not cause or contribute to a violation of the water quality standards.

Elimination of a CSO may be by sewer separation or by providing sufficient transport capacity to another location for treatment. If the CSO is eliminated by sewer separation, consideration should be given to the impact of the storm sewer on the receiving stream and the possible need for storm water treatment or control. If the CSO is eliminated by transport to another location, the transport capacity must be sufficient to contain the flow generated by a 25 year 24 hour storm without discharge.

Adequate treatment may be provided by a Retention-Treatment Structure that meets the "adequate treatment" criteria. (See "Items to Consider in Design of CSO Control Facilities" in Appendix D.) This criteria, established in many NPDES permits, is intended to be sufficiently protective that it can be applied to virtually any CSO to all but the smallest of receiving streams, and still expect that a water quality standard violation will not occur.

Site-specific adequate treatment criteria may be proposed by the discharger. Approval shall be based on a clear demonstration that the site-specific criteria will either (a) provide equivalent or better treatment and control, or (b) provide sufficient control to assure water quality standards will not be violated as a result of the discharge or as a result of the discharge in combination with other acceptable discharges.

- (a) While the "adequate treatment" definition strongly implies that Retention-Treatment Structures should be used, Best Management Practices (BMPs) and other technologies may be utilized where equivalent or better performance can be demonstrated.
- (b) Demonstrations that provide assurance that water quality standards will not be violated are very difficult technically due to the numerous time dependent variables involved. However, the "adequate treatment" definition is intended for use in most locations around the state so it follows that less stringent criteria are appropriate where very high dilution is available. The confidence that proposed criteria will not cause water quality standards violations needs to be greater as the amount of dilution available decreases. Specific water quality standards that need consideration include: Dissolved Oxygen (Rule 64) (including Sediment Oxygen Demand), Microorganisms (Rule 62), Floatable/Settleable Solids (Rule 50), and aquatic toxicity (Rules 57 and 82). In addition, consideration must be given to impairment of designated uses.

An approvable Final CSO Control Program must contain specific dates for accomplishment of important interim steps. For a single phase project these would include dates for completion of detailed Basis of Design, approval of plans and specifications (Act 98 permit issuance), commencement of construction, completion of construction, and placing facilities in full and effective operation. For multi-phase projects, similar dates should be included for each phase. For projects with phases that need to extend considerably into the future, less detailed milestones may be appropriate. More detailed interim elements should be included for early phases, such as approval by city council, advertisement for bids, preparation of financing documents, finalizing inter-agency agreements, etc.

Maximum Progress Feasible shall be achieved by the schedule proposed. Immediate compliance shall be required if feasible, but this is not expected to be the case. Site specific technical constraints need to be considered when evaluating proposed schedules. Technical constraints include the need for time to design facilities, obtain needed approvals and permits, advertise and review bids, obtain financing, construct

facilities, and attain operational level of facilities; the need to maintain operability of existing facilities while new facilities are constructed; and the need to maintain traffic flow and access to homes and businesses.

2. Long Term Monitoring

It is recognized that untreated CSOs will continue to discharge to waters of the state in some areas for a long time. The cost of eliminating or adequately treating all CSOs will be high. It is important to base significant expenditures of public funds on reliable data. Recognizing that the more obviously significant CSO impacts will be the first to be addressed by the dischargers, it will become more and more difficult to justify continuing expenditures without reliable long term monitoring. Secondly, engineers will be able to design lower cost control facilities capable of achieving water quality goals where reliable long term monitoring data are available. To these ends long term monitoring programs are necessary where adequate control will not be achieved in the near future.

It is also recognized that monitoring can be very expensive and that no matter how much data there are, more data are almost always desirable for decision making. A balance must be reached, recognizing the desire for definitive data, between the cost of generating data and the value of the data. The CSO permit language attempts to reach that balance by requiring the permittee to develop its own case specific long term monitoring program.

This program must document the rainfall, but does not specify how this is to be done. The sophistication of the rainfall monitoring system should reflect the use to which these data will be put. One purpose for rainfall data is to ensure that discharges only occur in response to rainfall events. Another purpose is to calibrate a sewer system model. Another is to provide the basis for a subsequent estimate of discharge volume. A simple rain gage read every 24 hours may be adequate for some purposes, but others may require mechanical gauges that record rainfall in 6 minute increments.

Another element of the long term monitoring program must document the frequency and duration of discharge events. This most likely will result in a monitoring device being installed at each CSO. However, it is possible that enough sewer system information is available to justify the substitution of one monitoring device for several CSO locations. The sophistication of the monitoring device may vary. In some locations a simple wind-up (or battery operated) clock with a float switch, that runs only during a discharge, may be adequate. This device would provide only the total time of discharges since the last inspection. More information may be gained by adding a chalked stick to indicate the maximum level of flow above the weir. Other situations may need flow measurement and telemetering systems.

The third element of the long term monitoring program must provide an estimate of the volume and quality of the discharge. A condition that the volume and quality be "measured" instead of "estimated" would result in very complex and expensive flow meters, sampling equipment, and staffing. Usually, precisely accurate volume and quality information is not valuable enough to warrant the cost. Therefore estimates are required for the long term. It may be appropriate to conduct short term flow measurement and quantitative analyses to use as the basis for the long term program of estimating volume and quality. The sophistication of the estimating procedure should reflect the potential impact on the receiving waters. The procedure may be as simple as assuming certain concentrations of various pollutants and certain flow rates remaining constant throughout the discharge, and calculating the loading from the duration monitoring device information. In other circumstances the procedure may need to involve use of a more complicated computer program utilizing time varying concentrations reflecting first flush characteristics and real time rainfall and other telemetering data.

The last element of the long term monitoring program determines the potential discharge of pollutants from significant industrial users. Since industrial wastes have the potential of being discharged to waters of the state without treatment through CSOs and since the Industrial Pretreatment Programs (IPP) usually regulate industrial discharges to the sewer system based on the potential impact resulting from discharge

of the wastewater treatment facility, significant environmental pollution may occur undetected. The condition to "determine potential discharge" of pollutants instead of "determine the discharge" of pollutants, reflects the expectation that most situations will not be environmentally critical. The "potential" can be calculated based on the maximum permitted discharge of toxicants into the sewer by significant industrial users and the amount of sanitary sewage and storm water dilution received prior to discharge through a CSO. In situations where this "potential" amount could be considered environmentally significant, actual sampling and analyses may be warranted. Where unacceptable environmental impact is identified, additional IPP controls must be applied.

3. Notification Procedures

Another Phase I condition calls for notification to the District Office, the local health department, and the local newspaper of CSO discharge events in accordance with notification procedures approved by the District Supervisor. This condition is also included in Section 7a of Act 245 of 1929 as amended, which includes additional responsibilities of the discharger. The purpose of this condition is to assure the public receives adequate notification of CSO impacts on pertinent water use areas when appropriate without creating unwarranted alarm. Each district office has consulted with local health departments in their areas to work out procedures for health advisories. Given the transient nature of CSO discharges it is important to have prompt notification. A permittee's ability to obtain discharge event information from each CSO will vary widely and will change as monitoring facilities are installed. Therefore the "procedures approved by the District Supervisor" must be flexible enough to address all situations, and to respond to improved monitoring. For example, the initially approved notification procedure may allow for some CSOs to act as surrogates for others, but as monitoring devices are installed the notification procedure should incorporate the best information available at the time. A "standing health advisory" by the local health department is not justification to waive the notification condition. The public expects the district staff and the local health department to have current information with regard to raw sewage discharges to surface waters, and there may be situations where the local health department may wish to issue a "special" health advisory. Where "standing health advisories" are issued by a health department, staff should work with health officials to ensure that such advisories are renewed and publicized frequently enough to appropriately inform the public of the ongoing health risks resulting from CSO discharges.

4. Interim CSO Report

Combined sewers, rightfully or not, have a reputation of being old, decayed, obsolete, and poorly maintained. This reputation, at least in many situations, is reflective of fact. The Interim Combined Sewer Overflow Report, required as a Phase I condition, is intended to identify areas where relatively inexpensive improvements can be made to reduce pollution and to gather basic information useful in subsequent elements of the CSO Control Program.

Discharges from CSOs are only authorized in "response to rainfall or snowmelt conditions when total available transportation and treatment capabilities are exceeded." In order to determine compliance with this condition it is necessary to have information regarding the combined sewer system's response to rainfall events and information on the collection system's capabilities and inadequacies. Where inadequacies exist, they should be promptly remedied, where feasible. Proper maintenance should be considered feasible. Rehabilitation may take longer, but unless a permanent solution is implemented on a short time schedule, it should not be deferred.

The inventory of significant industrial users is necessary to provide the potential discharge of pollutants from them in the Long Term Monitoring Program.

Information on receiving stream uses is useful in prioritizing studies and correction projects, as well as in aiding the local health department in deciding on health advisories.

5. Operations and Maintenance Plan

One common result of inadequate operation and maintenance of combined sewer systems has been the discharge of sewage in dry weather or discharges continuing long after a storm event. The immediate cause being either sticking or non-operational regulators or improperly adjusted regulators or diversion weirs. Since discharges are only authorized "in response to rainfall..." these discharges are permit violations. While the Interim CSO Report includes a condition to return all facilities to an operable state, it is left to the Operation and Maintenance Plan to detail the inspection frequency and the proper settings of floats, gates, and weirs. Preventive maintenance becomes the important consideration once the corrective maintenance is complete on each device. It may include periodic sewer cleaning and televising as well as regulator, diversion structure, and flap gate inspection/adjustment/maintenance. Determining the "proper" settings may be an involved process taking into account sewer capacities, basement elevations, and expected flows throughout an entire collection system.

B. Procedures for Staff Approval

Authority for approval of all permit-required submittals rests with the District Supervisor (and staff). Where submittals are unique, unconventional, or questionable the District Staff is expected to discuss the submittal with the Division's Design Review Committee. This committee includes the senior design review engineers from each of the districts and therefore provides an excellent forum for reducing geographical disparities. When consensus cannot be reached, the issues should be raised through the chain of command for resolution.

C. Procedures for Permit Incorporation

The status of CSO Program development and implementation should be reviewed by the Division's Permits Section as a part of the permit re-issuance process. The various Phase I conditions should be modified taking into account the status of each. For example, where a plan is required to be developed and implemented; and the plan is approved but not yet fully implemented; the permit drafted for reissuance should incorporate the approved plan by reference and require implementation.

Where the Final CSO Control Program is approved, a Phase II permit should be drafted that includes appropriate Phase I elements and a schedule of compliance leading to elimination or adequate treatment of CSOs to comply with the Water Quality Standards. Because the program and schedule in the draft permit should be as approved by the District Supervisor, the control program should be incorporated into the permit by reference. However, the more significant milestone dates should be explicitly reiterated in the permit schedule. Following reissuance of the permit with the Phase II schedule, milestone dates included in the approved Final CSO Control Program but not included in the permit schedule of Compliance may be modified by approval of the District Supervisor, but dates that are included in the permit schedule of compliance may only be modified through permit modification.

While it is clear that approval of a Final Program and incorporation of that program in a draft permit constitutes acceptance by the MDNR staff of the program, it does not necessarily lead to final acceptance by the MDNR. By statute, the permit issuance/reissuance process provides the opportunity for meaningful input by the public, for a decision by the MDNR, and for the right to a contested case hearing by an aggrieved party. Therefore, it is possible that a Phase II permit may require a modification to the approved program and/or the implementation schedule.

XI. Discussion of Various Complex Details

A. Definition of Sanitary, Storm, and Combined Sewers

1. Storm Sewers

A Storm Sewer is an enclosed conduit or open channel designed, constructed, and operated for the purpose of providing drainage of storm waters from surface run-off. Some Storm Sewers may have been designed, constructed, and operated to also provide conveyance of ground water and controlled (i.e., subject to permit) releases of industrial or commercial wastewater. Storm Sewers do not convey sanitary, commercial, or industrial wastewater needing treatment.

2. Sanitary Sewers

A Sanitary Sewer is an enclosed conduit designed, constructed, and operated for the purpose of conveying raw sanitary wastewater and treated or untreated industrial or commercial wastewater to a treatment facility. Normally ground water is not intentionally admitted into Sanitary Sewers, but occasionally ground water from footing drains, weep tiles, or sump pumps have been allowed. A Sanitary Sewer, including Sanitary Interceptor Sewers, may receive flow-regulated wastewater from Combined Sewers through Regulator Devices. This includes all flow in dry weather and a limited volume in wet weather. The wet weather flow volume may be limited by sewer capacity or contracted capacity. All flows admitted to a Sanitary Sewer or Sanitary Interceptor Sewer are considered to be sanitary sewage.

3. Combined Sewers

A Combined Sewer is an enclosed conduit operated for the purposes of providing drainage of storm waters from surface run-off, and of conveying raw sanitary wastewater, treated or untreated industrial or commercial wastewater, and (in many situations) ground water. Flow in a Combined Sewer is expected to be conveyed to treatment in dry weather, but may be discharged to the surface waters in wet weather through Regulator Devices. A sanitary sewer cannot be converted to a combined sewer by introduction, either intentionally or unintentionally, of surface runoff or groundwater. Some sewers were originally constructed as storm sewers and subsequently characterized as combined sewers for water pollution control purposes, but this practice is no longer considered acceptable.

4. Other Sewers

Sewers not meeting one of the above definitions shall be modified through design, construction, or operational means to conform to one of the above definitions.

B. Wet Sanitary Sewer Issues

Sanitary Sewers that, in fact, receive significant flow from surface run-off or ground water are often referred to as Wet Sanitary Sewers. This condition may exist as a result of prior conscious decision making and design, construction, and operation of cost-effective facilities in accordance with all legal requirements at the time. This condition may also exist as a result of neglect or abuse of an otherwise "normal" sanitary sewer. In either event, the regulation of discharges from such sewers shall be the same as Sanitary Sewers.

C. Construction of "New" Combined Sewers

Except in extremely unusual situations, construction of new Combined Sewers will not be permitted by the Department of Natural Resources. Repair or replacement of existing Combined Sewers may be permitted where it appears unfeasible to separate the sewers.

D. Sewers Tributary to Combined Sewers

1. New Separate Sanitary Sewers Tributary to Existing Combined Sewers

Wherever feasible, the construction of new sanitary sewers to serve developing areas should not be tributary to existing combined sewers. It is acknowledged that there will be situations where it is not feasible to provide sanitary sewer service to small areas without an additional sanitary load to combined sewers. It is essential in these instances, however, that the existing combined sewers have sufficient dry weather flow capacity to handle the increase. For all such areas, every reasonable effort should be made to find alternatives to generating new loads tributary to combined sewers, and additional control measures should be required to offset future pollutant load increases which will be discharged from the combined sewer facilities.

2. Existing Separate Sanitary Sewers Tributary to Existing Combined Sewers

Whenever feasible, existing separate sanitary sewers tributary to existing combined sewers shall be rerouted to treatment without opportunity for discharge through combined sewer facilities. Small areas served by sanitary sewers may need to remain tributary to combined sewers indefinitely. Long range sewer planning should consider the means to reroute sanitary sewer flows to treatment without opportunity for discharge through combined sewer facilities.

3. Storm Sewers Tributary to Existing Combined Sewers

Wherever feasible, separate storm sewers should not be tributary to combined sewers. It may be appropriate to allow this condition to exist for a short period of time while long term projects are implemented to adequately control both combined sewers and storm sewers, or where small areas served by separate storm sewers have no alternate outlets readily available.

E. Combined Sewers Tributary to Sanitary Interceptor Sewers

Where combined sewer flows are regulated by a device (regulator) that directs dry weather flow to a sanitary interceptor for transportation to treatment and directs wet weather flow to the surface waters, the sewage flows in the interceptor shall be considered sanitary wastewater. Exceptions to this policy should be allowed only for an interim period, during which adequate facilities for transporting the sanitary wastewater are constructed.

XII. Determining Compliance with Treatment Technology Based Requirements of Phase I (BAT, BCT & BPJ)

The NPDES permits with Treatment Technology Based Requirements require the CSO dischargers to comply with those requirements. Under some circumstances compliance with these requirements is subject to interpretation. The following discussion is intended to lead the dischargers and the MDNR staff to consistent interpretations.

A. Proper Operation and Regular Maintenance of the Sewer System and Combined Sewer Overflow Points

The purpose of this requirement is to assure the CSO discharger develops and implements effective procedures that result in a reduction of CSO pollutant discharges, or in maintaining the maximum practical effectiveness of the existing system in containing wet weather flows. While agencies operating CSO systems can be expected to have an existing Operation and Maintenance (O&M) program, the permit requires that a written O&M Plan be submitted (see X.A.5. above). This Plan becomes an enforceable provision of the permit six months after approval.

B. Maximum Use of the Collection System for Storage

The purpose of this requirement is to assure the CSO discharger takes appropriate steps to maximize the wet weather storage that can be provided by the existing conveyance system. This will reduce the frequency and quantity of combined sewer overflows. Techniques that will be applicable (if any) will be dictated by the characteristics of the collection system. Inappropriate modifications to the collection system, intended to maximize storage, pose the danger of causing flow back-ups in the system and flooding of basements or streets with sewage, with attendant public health and flood damage risks. Methods and techniques that should be considered include sewer inspection to identify flow restrictions, flap gate maintenance, adjustment of regulator settings, removal of bottlenecks, restricting catch basin inlets, and adjustment of pump station operations. These and other opportunities for minimizing the impact of CSOs should be evaluated in the Interim Combined Sewer Overflow Report (see X.A.4. above).

C. Implementation of Pretreatment Programs to Assure CSO Impacts are Minimized

The purpose of this requirement is to assure the CSO discharger considers the potential impacts of industrial discharges to the sewer system on the CSO discharge quality. The Interim Combined Sewer Overflow Report (see X.A.4. above) requires the CSO discharger to list significant industrial users and their waste constituents tributary to each CSO, and the Long Term Monitoring Program (see X.A. 2. above) requires a determination of the potential discharge of pollutants from these sources. If this information implies that the industrial pollutants are a significant contribution to Water Quality Standards violations, the MDNR shall take appropriate action to remedy the situation. Since the CSO discharger may not be the Control Authority under the Pretreatment Program, careful consideration needs to be given to the appropriate action. The Control Authority may need to revise technically based local limits or restrict discharge timing to assure the CSO does not contribute to Water Quality Standards violations. MDNR approval is necessary for changes to the Pretreatment Program.

D. Maximization of Flow to the Treatment Facility

The purpose of this requirement is to assure the CSO discharger maximizes the volume of wet weather flows that are delivered to and processed at the Wastewater Treatment Plant. The permit discharge authorization statement includes this requirement. Clearly, the more wet weather flow that is delivered to the Treatment Plant, the lower the volume of CSO discharges. If the wet weather flow delivered to the Treatment Plant is too high or continues too long, upsets to the biological processes can result in degraded performance for periods that extend well beyond the duration of the wet weather. Therefore, care must be taken where the physical facilities are capable of delivering such flows to not cause an upset. It is likely that most Treatment Plants will have the ability to accept increased flows during wet weather. It is also likely that some appropriate engineering analysis will be required to determine the extent to which they can safely do so, and remain in compliance with their discharge permit's effluent limits.

Not all CSO dischargers control the Wastewater Treatment Plant. In this situation, the CSO discharger must utilize its authorized capacity within the constraints of the physical facilities to minimize CSO discharges.

E. No Dry Weather Overflows

The purpose of this requirement is to make clear that dry weather discharges are not CSOs and are not authorized. To help assure that there will not be any dry weather overflows, the permits contain a provision for an Operations and Maintenance Plan (see X.A.5. above) and a collection system inventory as part of the Interim Combined Sewer Overflow Report (see X.A.4. above).

F. Control of Solid and Floatable Materials Where Required

The purpose of this requirement is to assure the CSO discharger is aware of the high public visibility and severe aesthetic impact that solid and floatable materials can have. Although the primary adverse impact may be aesthetic in nature, public health concerns are also significant because of the presence of syringes and other medically-related items in this class of materials. The treatment technologies available to deal with this class of materials include those actions required elsewhere to maximize utilization of the transportation and storage capabilities of the collection system and treatment capabilities of the Treatment Plant. However, site-specific controls may be required (through special permit conditions) where the problem is particularly acute. Such controls may include screening, skimming, and source control.

G. Consideration of Pollution Prevention Programs to Reduce Contaminants

The purpose of this requirement is to assure the CSO discharger is aware of the potential for pollution prevention programs to reduce the amount of pollutants. Consideration should be given to encouraging pollution prevention strategies by industries and commercial developments tributary to CSOs. Public education campaigns may also be effective in reducing the amount of litter and household hazardous wastes tributary to CSOs.

H. MDNR Notification in Accordance with Approved Notification Procedures

The purpose of this requirement is to assure the public receives adequate notification of CSO impacts on pertinent water use areas when appropriate without creating unwarranted alarm. The intent is to insure that persons using these areas are provided a reasonable opportunity to inform themselves of the existence of potential health risks associated with the use of the water body, using the exceedance of relevant water quality standards as an indicator of potential risk, tempered by the professional judgment of local health officials. The most appropriate mechanism for public notification is expected to be through the local public health authorities. Therefore, the development of clear understandings and procedures between the CSO dischargers, the MDNR, local newspapers, downstream communities, and the local health department is essential (see X.A.3. above).

I. Implementation of an Approved Monitoring Program

The purpose of this requirement is to assure the CSO discharger maintains current information on the frequency, duration, and potential impact of untreated discharges. Any monitoring program that involves collection of water samples and laboratory analysis of a suite of pollutants, tends to be costly. Logistical concerns and personnel safety combine with the cost to motivate the discharger to minimize the monitoring program. The Long Term Monitoring conditions (see X.A.2. above) allows for significant flexibility in the design of a monitoring program that will achieve the stated purpose.

XIII. Determining Compliance where the Control Program is Based on "Adequate Treatment"

Where a CSO discharger has provided control of all or a portion of its CSOs, and that control is based upon the definition of "Adequate Treatment" provided in Section V.B. above, the MDNR, the discharger, and the public may find the determination of compliance problematic. Clearly it is in the best interest of all concerned to have an agreed upon method of determining compliance with the permit conditions. The following discussion is meant to provide a framework within which an objective analysis of performance can be used to determine compliance with the discharge permit conditions. If control is based upon another, but similar, set of criteria this discussion may be equally useful.

The level of control necessary to be "adequate" is based upon what is necessary to prevent a CSO discharge from causing a violation of Water Quality Standards. Therefore, the control level is "water quality based," not "treatment technology based." This is so, even though the description of the control level is in terms of treatment technologies. The individual control facilities need to be designed upon theoretical design conditions. Such design conditions seldom, if ever, occur in the real world, therefore confirmation that the control facilities actually perform at the intended level is difficult.

The following discussion of determining compliance is separated into the three basic elements of the "adequate treatment definition" stated in V.B. above.

A. Retention of the One-year One-hour Storm

- *retention, for transportation and treatment at the wastewater treatment plant, of combined sewage flows generated during storms up to the one-year, one-hour storm*

Clearly any retention facility has the capability to hold only so much wastewater. Once the facility is constructed the capacity cannot be easily increased. Therefore the selection of the retention capacity is the primary factor that governs design. Usually design engineers use a sewer system model, or a mathematical representation of the collection system, to predict the volume of combined sewage generated by a one-year one-hour storm. In Michigan, a one-year one-hour storm is from 0.8 to 1.2 inches of precipitation in one hour. The volume of sewage generated by this storm will depend on many factors including the area of land contributing runoff, the porosity of the land surfaces, the amount of pavement and roofs, and whether the soil is wet, dry, or frozen. It is necessary to employ considerable judgment to compute this volume, and different competent experts can be expected to calculate different volumes given the same information. Therefore when a facility is built, it may or may not actually be capable of retaining the volume of a one-year one-hour storm.

Rain does not fall in a totally uniform pattern, at a uniform rate, for exactly one hour. Yet these are the conditions used in the mathematical model used to predict the volume needing to be retained. Therefore, again, considerable judgment must be used to determine whether or not the constructed facility is adequate. Any one storm clearly is not sufficient to conclude one way or the other. Several storms, in the 1 inch per hour range, would need to be considered along with the facility operating data to come to a conclusion. For example, if 0.6 inches of rain fell in the first two hours of a storm event and a discharge occurred, then one would suspect that the facility may not be adequate. Similarly, if 1.4 inches of rain fell in the first hour of a storm event and no discharge occurred, then one would expect that the facility is adequate. In either event, however, one would need to be aware of possible extenuating circumstances that influence the judgment. For example, the soils in the area may be saturated due to springtime snow melt conditions just prior to the storm and additional runoff may have been generated by the melting snow. If a sophisticated sewer system model were used to design the retention facility, it may be useful to recalibrate that model following construction to verify pre-construction judgments. In any event, a professional judgment will need to be made on the basis of an analysis of numerous events and the extenuating circumstances associated with each.

B. Primary Treatment of the Ten-year One-hour Storm

- ***primary treatment of combined sewage flows generated during storms up to the ten-year, one-hour storm (thirty minutes detention or equivalent for settling, skimming, and disinfection)***

Clearly any CSO treatment facility has the capability to provide a minimum of 30 minutes detention to only so much wastewater flow. Once the facility is constructed the capacity cannot be easily increased. Therefore, similar to the retention criterion above, the size of the facility is the primary factor that governs design. Design engineers need to consider both criteria and ensure that the facilities they design are capable of meeting both. Also similar to the retention criterion, a sewer system model is usually used to predict the flow rate of sewage generated by a ten-year one-hour storm. In Michigan, the ten-year one-hour storm is from 1.4 to 2.0 inches of precipitation in one hour. The flow rate of sewage generated by this storm will depend on many factors including the area of land contributing runoff, the shape of the contributing area, the slope of the land and the sewers, and the presence of any flow rate limiting factors like pumping stations or sewer pipe diameters. It is necessary to employ considerable judgment to compute the flow rate, and different competent experts can be expected to calculate different results given the same information. Therefore, when a facility is built, it may or may not actually be capable of providing 30 minutes detention for the ten-year one-hour storm.

In reality rain does not fall in the neat patterns used in mathematical models, therefore considerable judgment must be used to determine whether or not the constructed facility is adequate. This judgment should not be based on any single storm, but on an analysis of several storms of a magnitude near the ten-year one-hour storm. The sewer model used for design purposes can be very useful in this analysis. Field experience that identifies the extenuating circumstances can also be very useful.

The judgment of whether or not the facility is capable of providing 30 minutes detention at the ten-year one-hour storm, while very important, is not the only judgment necessary to determine compliance with this criterion. It is expected that the primary treatment provided will be effective in removal of settleable and floatable solids and in disinfecting the wastewater. Evidence of short-circuiting should be viewed with concern. Dye testing may be required to confirm or refute suspected short-circuiting.

C. Treatment of flows in excess of the Ten-year One-hour Storm

- ***treatment of combined sewage flows generated during storms in excess of the ten-year, one-hour storm to the extent possible with facilities designed for lesser flows***

It is expected that facilities built to provide 30 minutes detention at the ten-year one-hour storm, will be designed to transport all flows to the CSO control facility, that are transported by the existing collection system. Since most storm and combined sewers are designed to handle the ten year storm without surcharging, this will probably mean that flow greater than those generated by the ten-year one-hour storm may need to be transported. This criterion means that such greater flows need to be treated but that the degree of treatment would be less than 30 minutes detention. Since such storms occur only infrequently the diminished treatment provided would still be considered adequate. The important factor here is that there would be no untreated overflows at the CSO control facilities. No untreated overflows implies that pump stations should be provided with firm pump capacity to handle all flows transported by the existing collection system even when it may be more than the 10 year storm flow. Capacity to handle flows in excess of the 25 year 24 hour storm, however, will not be required.

D. Compliance with the Permit Implies Compliance with the Standards

Act 245 of 1929 prohibits discharges that cause violations of the Water Quality Standards. The discharge permit establishes the conditions necessary to comply with this prohibition. Therefore a discharge which is in compliance with the final conditions of a discharge permit implies compliance with the Water Quality Standards. However, a discharge that causes damage to the natural resources, even if it is authorized by a discharge permit, may be a violation of other state laws or may be subject to recovery of damages.

Permits that authorize discharges from CSO control facilities designed consistent with the "adequate treatment definition," will include conditions dealing with the operation and maintenance (O&M) of those facilities. These O&M conditions are, in effect, the effluent limitations of the CSO control facilities. Therefore compliance with the permits' O&M (and other) conditions constitutes compliance with the Water Quality Standards. Such permits may also require post construction evaluations of the facilities' capabilities to confirm that sufficient control to comply with the Water Quality Standards at times of discharge has been provided.

If an evaluation of the performance of a CSO control facility concludes that the facility falls short of the adequate treatment definition or that the Water Quality Standards may be violated, the conclusion does not constitute a discharge permit violation nor a Water Quality Standards violation. That conclusion, however, is cause for a re-evaluation of the adequacy of the discharge permit conditions. The re-evaluation would be adequate justification to change the conditions of the discharge permit either by modification or reissuance. The particular changes would need to be determined on a case by case basis, but may include a schedule of compliance for the construction of additional facilities. These changes, just as all permit changes, are subject to public notice, opportunity for public hearing, and administrative appeal.

If a CSO control facility fails to meet its design intent then various alternatives are available to the CSO discharger. The most obvious alternative is to build bigger, more effective retention-treatment facilities. But other, and probably less costly, alternatives are also available. Some possibilities include: reduce flow through Infiltration/Inflow removal or sewer separation, re-route some sewage flow elsewhere, attenuate flow to make the facility perform better, and demonstrate that the existing facility is adequate to meet the Water Quality Standards.

DRAFT

MICHIGAN STATE-WIDE COMBINED SEWER OVERFLOW
PERMITTING STRATEGY

Developed by: The Michigan Department of Natural Resources
Surface Water Quality Division
Municipal Permits Unit

January 11, 1990

I. Introduction and Objectives

Combined sewer overflows (CSOs) are a serious environmental concern in many areas of the State. Combined sewers are sewers designed, constructed and operated to carry both sanitary sewage and stormwater runoff. CSOs are structural devices on combined sewer systems that divert sanitary sewage mixed with stormwater to a river, stream, or lake. Most of the time the CSO structure directs all sanitary sewage and minor amounts of stormwater to a wastewater treatment facility. During wet weather events, when flows exceed the capacity of the sewer, sewage and stormwater overflow to the surface waters.

Michigan's Water Quality Standards were updated in 1985 and 1986. The 1986 amendments included protecting all waters for total body contact. CSO corrections necessary to assure compliance with Michigan's current Water Quality Standards are being established through the NPDES permit program.

The Michigan Department of Natural Resources (MDNR) and the Water Resources Commission (MWRC) have been addressing the water quality impairment caused by CSOs through the NPDES discharge permit process. NPDES permits establish a phased program to accomplish the following objectives:

- A. Ensure optimal operations to minimize the adverse impacts of CSOs and to make certain that CSOs only occur as a result of wet weather,
- B. Establish an effective notification system,
- C. Develop a strong database on combined sewer system operation and CSO discharges, and
- D. Eliminate or adequately treat CSOs to comply with the water quality standards and the state law prohibition of raw sewage discharges according to schedules reflecting maximum feasible progress.

II. Identification

All CSOs in Michigan have been identified. Over the years permits have been issued for essentially all CSOs for which applications have been filed. Current lists are available by contacting the Surface Water Quality Division. The inventory of CSO discharges and permitting priorities will be updated annually as necessary. Communications with EPA on these annual permitting plans will be via the Program Planning Process.

III. Priorities

CSO permit actions have the following priorities:

1. Reissuance of major permits for facilities with CSOs planned for reissuance during the Fiscal Year.
2. Issuance of permits for all unpermitted CSOs for which applications have been received. If applications have not been submitted, appropriate regulatory action will be taken to assure timely submittal.
3. Termination of CSO permits where CSOs have been eliminated.
4. Reissuance of miscellaneous high priority CSO permits identified by the District Offices.
5. Reissuance of all other expired permits for untreated CSOs.
6. Reissuance of all expired permits for CSO facilities which have existing treatment.

IV. Permit Issuance

All CSOs tributary to a single treatment works and under the administrative control of a single entity are permitted under a single NPDES Discharge Permit. The operator of the outfall sewer from which sewage enters the waters of the state is generally assumed to be the entity with administrative control. This entity is not necessarily the local unit of government in which the outfall is located or the local unit of government generating the wastewater. In some cases, county agencies or sewer authorities operate sewerage systems and therefore have administrative control.

V. Permit Requirements

It is the intent of the MWRC to establish the necessary requirements in CSO permits to accomplish the objectives of this strategy, consistent with state law, including the following:

- A. Minimum Technology-Based Requirements (BPJ)
 1. Proper operation and regular maintenance of the sewer system and combined sewer overflow points;
 2. Maximum use of the collection system for storage;
 3. Implementation of pretreatment programs to assure CSO impacts are minimized;
 4. Maximization of flow to the treatment facility; and
 5. No dry weather overflows.

Appendix A.3

B. Phase I Requirements

1. Designation of an operations and maintenance manager for the collection system;
2. Implementation of procedures to notify the MDNR of overflow events;
3. Immediate actions to reduce, control, and monitor CSOs;
4. Development and implementation of an operations and maintenance plan;
5. Preparation of a detailed CSO report;
6. A long term CSO monitoring program; and
7. A fixed date requirement for development of an approvable Final CSO Control Program which shall contain milestones resulting in the maximum progress feasible for elimination or adequate treatment of combined sewage discharges to comply with the Water Quality Standards at times of discharge.
8. Construction of CSO control or related projects which are feasible and consistent with the Final CSO Control Program.

C. Phase II Requirements

All remaining segments of the Final CSO Control Program are to be completed under Phase II. Implementation will be accomplished by incorporating the schedule developed under Phase I into subsequent permits. The Final CSO Control Program will assure compliance with state law and standards through the elimination or adequate treatment of CSOs. Adequate treatment will be determined on a case-by-case basis with staff of the MDNR working closely with municipalities in defining the necessary and appropriate correction programs.

The degree of treatment required at any particular location shall protect the designated uses of the receiving stream and meet the Water Quality Standards at times of discharge. As a minimum, the treatment must assure adequate floatable and settleable solids removal and adequate disinfection.

It is recognized that it is difficult to establish detailed case-specific effluent limitations for treated CSO discharges based on the water quality standards. In the absence of sufficient site-specific information upon which to define site-specific adequate treatment, the following would generally be considered adequate treatment:

- retention, for transportation and treatment at the wastewater treatment plant, of combined sewage flows generated during storms up to the one-year, one-hour storm,

Appendix A.4

- primary treatment of combined sewage flows generated during storms up to the ten-year, one-hour storm (thirty minutes detention or equivalent for settling, skimming, and disinfection), and
- treatment of combined sewage flows generated during storms in excess of the ten-year, one-hour storm to the extent possible with facilities designed for lesser flows.

Where this adequate treatment criterion is used in a permit, the discharger will be provided an opportunity for a case-specific demonstration that other criteria for control will achieve the goals of elimination of raw sewage discharges, the protection of the Designated Uses, and compliance with the Water Quality Standards at times of discharge.

D. Additional Phases

Where the CSO correction program is particularly large and complex, additional Phases may be established by the MWRC. For example, in the Rouge River Basin in Southeast Michigan, the MWRC established an interim phase, between Phase I and Phase II, with the objectives of elimination of raw sewage and public health protection.

E. Compliance Schedules

Permits will contain compliance schedules to accomplish the maximum feasible progress in meeting the CSO objectives, taking into account technical and economic constraints. BPJ requirements were to be met by July 1, 1977, and permits will require immediate compliance with those requirements.

F. Monitoring

Permits will require that the permittee notify the MDNR of CSO discharge events in accordance with formal notification procedures approved by the District Office. The notification procedures will be updated as facility modifications are made to allow better information to be obtained.

Permits also require that a fully adequate monitoring program be developed and implemented according to a fixed date schedule. The program is to:

1. Document the rainfall, and the frequency and the duration of all discharge events,
2. Estimate the volume and quality of discharges, and
3. Determine the potential pass-through of pollutants from significant industrial users.

VI. Water Quality Standards Modification

The current Michigan Water Quality Standards apply at all flows greater than the lowest monthly 95% exceedance flow. Therefore the Standards apply during wet weather. No changes to the Standards are anticipated to address applicability during wet weather. Use attainability analyses may be performed on a case-by-case basis.

VII. Funding

Michigan is administering the State Revolving Fund (SRF) which, with leveraging, will provide approximately one billion dollars for low interest loans for sewage treatment works, including CSO control. In accordance with Section 201 (n)(1) of the Clean Water Act, Michigan is authorized to fully use the SRF to assist the correction of combined sewage overflows. Communities with combined sewer overflows have been notified of the State's CSO initiative and permits are being issued requiring communities to develop programs to provide adequate control and/or treatment. Communities which adequately fulfill the SRF requirements will be eligible for low interest loans for CSO Projects.

VIII. Permit Application Forms

CSO dischargers shall utilize the MDNR Municipal Wastewater Discharge Application Form (PR 4856-9/87) to apply (for existing unpermitted discharges) or to re-apply for the NPDES discharge permit. Applications shall be submitted at least 180 days prior to permit expiration.

SAMPLE PERMIT LANGUAGE FOR CSOs
June 1993

1. Discharges From Combined Sewer Systems

a. Limited Discharge Authorization

The permittee is required to utilize, to the maximum extent practicable, available sewerage system transportation capabilities for the delivery of combined sewage to treatment facilities. For an interim period during which the final combined sewer overflow control program is to be implemented, the permittee is authorized to discharge combined sewage flows in response to rainfall or snowmelt conditions when total available transportation and treatment capabilities are exceeded from the outfalls and locations listed below:

<u>OUTFALL</u>	<u>LOCATION</u>	<u>RECEIVING WATERS</u>
Outfall Number	Location of Outfall	River or Stream

provided, however, that nothing in this paragraph shall be construed to limit the State of Michigan's ability to recover damages resulting from such discharges.

b. Interim Combined Sewer Overflow Control Program

(1) On or before date the permittee shall designate an operations and maintenance manager to be in responsible charge of the wastewater collection system and serve as the contact person for department personnel regarding combined sewer discharges. The permittee may replace the manager at any time and shall notify the district name District Supervisor of the Surface Water Quality Division within ten days after the replacement.

(2) In the event of a combined sewer overflow discharge, the permittee shall notify the district name District Supervisor of the Surface Water Quality Division in accordance with notification procedures approved by the district name District Supervisor, the local health department, and a daily newspaper of general circulation in the county in which the permittee is located. Notification that the discharge is occurring shall be made promptly after the discharge starts. After the conclusion of the discharge, the permittee shall provide written notification to the above parties of the following:

- (a) the amount of discharge as measured in accordance with the procedures approved by the district name District Supervisor,
- (b) the reason for the discharge,
- (c) the time the discharge began and ended as measured in accordance with the procedures approved by the district name District Supervisor, and
- (d) verification that the permittee is in compliance with the combined sewer overflow requirements of this permit. If such verification cannot be made, an explanation shall be provided detailing the reasons why the permittee is not in compliance with the combined sewer overflow requirements of this permit.

PART I

Section A.I.b.(2) (continued)

The permittee shall also annually contact municipalities whose waters may be affected by the permittee's discharge of combined sewage, and if those municipalities wish to be notified in the same manner as specified above, the permittee shall provide such notification. Such notification shall also include a daily newspaper in the county of the affected municipality.

(3) The permittee shall immediately commence to reduce, control, and monitor Combined Sewer Overflows. On or before date, the permittee shall submit a progress report to the district name District Supervisor of the Surface Water Quality Division that summarizes the activities being undertaken. Such activities shall include:

- (a) ensuring that all Combined Sewer Overflow regulators function to minimize the discharge of wastewater,
- (b) identifying and eliminating unauthorized connections to the sewer system,
- (c) reducing excessive infiltration and inflow sources within the permittee's jurisdiction, and
- (d) commencing negotiations with other communities within the sewer service area to eliminate excessive infiltration and inflow.

(4) The permittee shall submit a written operations and maintenance plan to ensure that discharges only occur in response to rainfall (or snowmelt) events and cease soon thereafter. The approvable plan shall be submitted to the district name District Supervisor of the Surface Water Quality Division on or before date. The plan shall be implemented no later than six months after approval.

(5) The permittee shall prepare an approvable Interim Combined Sewer Overflow Report on the combined sewer system which shall be submitted to the district name District Supervisor of the Surface Water Quality Division on or before date. The report should be flexible and tailored to site-specific issues and shall include:

- (a) information regarding the combined sewer system's response to rainfall events including information on frequency and duration of discharge events and estimated volume and quality of the discharges.
- (b) a listing, by combined sewer overflow, of significant industrial users (as identified in the control authority's approved pretreatment program) and constituents of the users discharges that may be tributary to the overflow.
- (c) a system inventory describing the sewer system tributary to each outfall including identification of separate sewers, combined sewers, storm sewers, excessive infiltration and inflow sources, significant industrial users, and unauthorized connections. The inventory shall also provide information on sewers that are cracked, depressed, or of questionable physical integrity; flow restrictions due to excessive sludge buildups or other conditions; and an assessment of each regulator's operability and reliability. Sewer system evaluation studies previously conducted should be utilized where appropriate in preparing the inventory.

Appendix
B.2

Michigan Combined Sewer Control Program Manual

PART I

Section A.I.b.(5) (continued)

- (d) information on receiving stream uses downstream of each outfall to aid in determining the probable environmental and public health impacts of overflows. This information should be utilized in determining correction project priorities.
- (e) a prioritized list of rehabilitation and maintenance needs and a proposed schedule for meeting those needs.

The proposed schedule for meeting the rehabilitation and maintenance needs shall be implemented upon approval of the Interim Combined Sewer Overflow Report.

(6) On or before date the permittee shall develop and implement an approvable long term monitoring program which will (a) document the rainfall, the frequency and the duration of discharge events, (b) estimate the volume and quality of discharges, and (c) determine the potential discharge of pollutants from significant industrial users. The data collected shall be submitted monthly to the district name District Supervisor of the Surface Water Quality Division.

(7) The permittee shall design and construct the following facilities in accordance with the following schedule:

(List of Planned Facilities)

- (a) Submit an approvable conceptual design to the district name District Supervisor of the Surface Water Quality Division on or before date.
- (b) Submit approvable plans and specifications to the district name District Supervisor of the Surface Water Quality Division on or before date.
- (c) Commence construction on or before date
- (d) Complete construction and place in operation on or before date

c. Final Combined Sewer Overflow Control Program

The permittee shall develop an approvable Final Combined Sewer Overflow Control Program (Control Program), including an implementation plan which will result in the elimination or adequate treatment of combined sewage discharges containing raw sewage, to comply with the Water Quality Standards at times of discharge. The Control Program shall evaluate financing mechanisms and contain fixed date milestones that result in maximum progress feasible, taking into account site specific economic and technical constraints. The permittee shall actively involve the affected public in the development of the program and document the steps taken in this regard. The Final Combined Sewer Overflow Control Program shall be submitted to the district name District Supervisor of the Surface Water Quality Division on or before date. This permit may be modified in accordance with Part II.D.4., to incorporate the Control Program.

Appendix B.3

PART I

Section A.1.c. (continued)

The following would constitute adequate treatment of combined sewage discharges to meet Water Quality Standards at times of discharge:

- retention, for transportation and treatment at the wastewater treatment plant, of combined sewage flows generated during storms up to the one-year, one-hour storm,
- primary treatment of combined sewage flows generated during storms up to the ten-year, one-hour storm (thirty minutes detention or equivalent for settling, skimming, and disinfection), and
- treatment of combined sewage flows generated during storms in excess of the ten-year, one-hour storm to the extent possible with facilities designed for lesser flows.

Other controls may constitute adequate treatment and the permittee may demonstrate to the Michigan Department of Natural Resources that adequate treatment can be achieved using other methods of control. If the demonstration is successful the permit shall be modified accordingly.

Following implementation of any phase of the approved Control Program, the Control Program may be reevaluated by the permittee or the Surface Water Quality Division. This permit may be modified in accordance with Part II.D.4., to incorporate revisions necessary to conform with pertinent rules or laws, or as necessary to address prevailing situations.

d. New Wastewater Flows

Increased levels of discharge of sanitary sewage from the Combined Sewer Overflow outfalls listed in item a., above, are prohibited unless:

- (1) these increased discharges are the result of new sanitary wastewater flows which, on the basis of sound professional judgment, are within design peak dry weather transportation capacity; or
- (2) the permittee has officially adopted and is timely implementing a definite program, satisfactory to the Department, leading to the construction and operation of necessary collection, transportation or treatment devices.

federal register

**Tuesday
April 19, 1994**

Part VII

**Environmental
Protection Agency**

**Combined Sewer Overflow (CSO) Control
Policy; Notice**

Federal Register / Vol. 59, No. 75 ./ Tuesday, April 19, 1994 / Notices
pages 18688 - 18698

(NOTE: THE CONTENTS OF THE FEDERAL REGISTER IS NOT INCLUDED IN THIS DOCUMENT)

Appendix C.1

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Items to Consider in Design of CSO Control Facilities

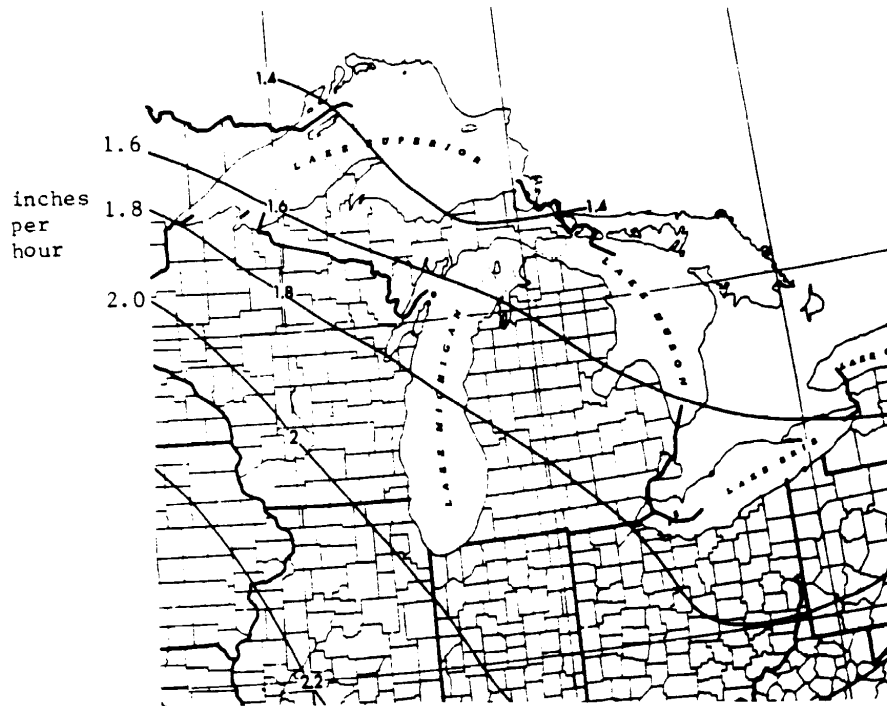
1. The Ten-Year One-Hour storm and the One-Year One-Hour storm shall be as defined in the Rainfall Frequency Atlas of the United States, published by the United States Department of Commerce, May 1961. These values, selected from the isopluvial maps, should be adjusted by the Area-depth curves (Figure 15) for service areas greater than a few square miles. It is based on year round precipitation events.
2. Rainfall shall be assumed to be of uniform intensity and distribution over the entire service area for a duration of exactly one hour. Zero rainfall shall be assumed both before and after the one hour rainfall event.
3. Antecedent conditions shall be assumed to be average warm weather conditions.
4. Retention/Treatment Structures are to be sized based on case-specific sewer system response to the two theoretical design storms, ie. the Ten-Year One-Hour storm and One-Year One-Hour storm. Thirty minutes detention time for solids removal and disinfection at the Ten-Year storm, or retention of all flow at the One-Year storm will govern design. Where "equivalent" facilities are proposed, both criteria would be considered.
5. Detention time for solids removal and disinfection should be calculated on the basis of maximum hourly flow.
6. Sewer system response shall be estimated utilizing data gathered for the Interim Combined Sewer Overflow Report, and appropriate engineering models (Rational Method, Unit Hydrograph, SWMM, etc). Actual data should be used. Time of Concentration should NOT be assumed to be one hour, just because we use the one-hour storm as a definition.
7. Retention/Treatment Structures are to be configured to optimize solids removal and disinfection. Compromises due to site constraints may be necessary.
8. It is assumed that retained wastewater will be discharged to the interceptor for full treatment during and following a storm event, however, dewatering a clarified and disinfected (perhaps dechlorinated) effluent to the receiving stream may be considered on a case-by-case basis.
9. Dewatering rate needs to be determined on a case-by-case basis. Dewatering times of less than 48 hours will generally be desirable.
10. Disinfection should be controlled to achieve less than 400 fecal coliform per 100 ml and to minimize potential aquatic toxicity.
11. Dechlorination will not be required unless case-specific water quality impacts are documented or expected. For example, if Basin dewatering is to be to the surface waters over a prolonged period, chlorine control may be required.

6/30/89 FEC

Appendix D.1

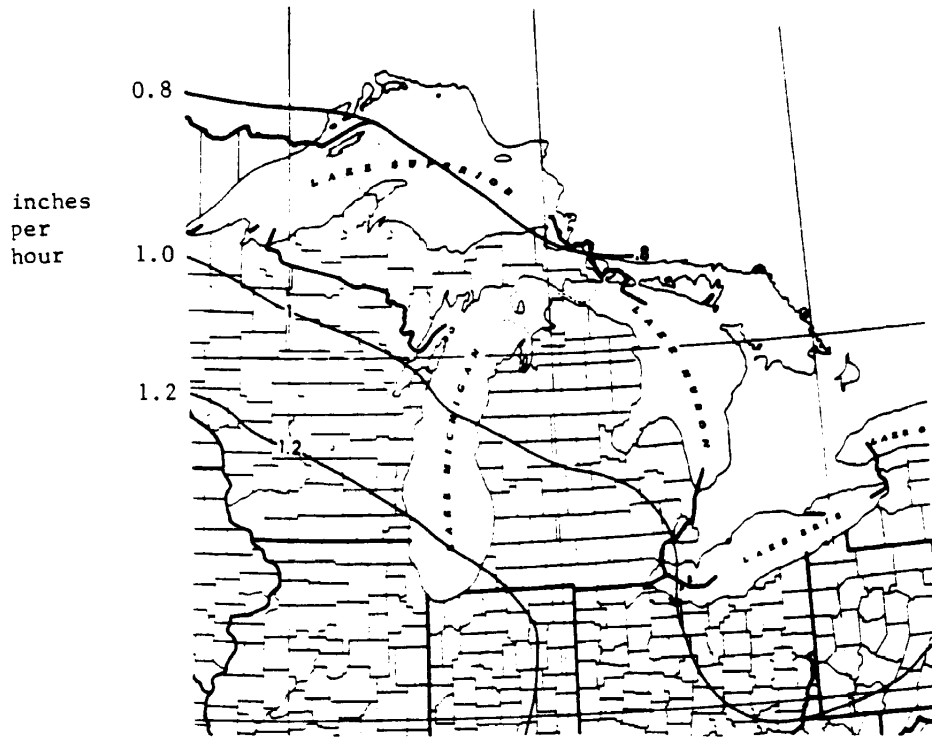
TEN YEAR - ONE HOUR STORM CHART 11

Technical Paper No. 40
Rainfall Frequency Atlas of the United States,
US Dept. of Commerce, May 1961



ONE YEAR - ONE HOUR STORM CHART 8

Technical Paper No. 40
Rainfall Frequency Atlas of the United States,
US Dept. of Commerce, May 1961



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Rainfall Frequency Atlas of the United States,
US Dept. of Commerce, May 1961

Area-depth relationships

General - For drainage areas larger than a few square miles consideration must be given not *only* to point rainfall, but to the average depth over the entire drainage area. The average area-depth relationship, as a percent of the point values, has been determined for 20 dense networks up to 400 square miles from various regions in the United States [7].

The area-depth curves of figure 15 must be viewed operationally. The operation is related to the Purpose and application. In application the process is to select a point value from an isopluvial map. This point value is the average depth for the location concerned, for a given frequency and duration. It is a composite. The area-depth curve relates this average point value, for a given duration and frequency and within a given area, to the average depth over that area for the corresponding duration and frequency.

The data used to develop the area-depth curves of figure 15 exhibited no systematic regional pattern [7]. Duration turned out to be the major parameter. None of the dense networks had sufficient length of record to evaluate the effect of magnitude (or return period) on the area-depth relationship. For areas up to 400 square miles, it is tentatively accepted that storm magnitude (or return period) is not a parameter in the area-depth relationship. The reliability of this relationship appears to be best for the longer durations.

EXAMPLE. What is the average depth of 2-year 3-hour rainfall for a 200-square-mile drainage area in the vicinity of 37° N., 86° W.? From the 2-year 3-hour map, 2.0 inches is estimated as the average depth for points in the area. However, the average 3-hour depth over the drainage area would be less than 2.0 inches for the 2-year return period. Referring to figure 15, it is seen that the 3-hour curve intersects the area scale at 200 square miles at ratio 0.8. Accordingly, the 2-year 3-hour average depth over 200 square miles is 0.8 times 2.0, or 1.6 inches.

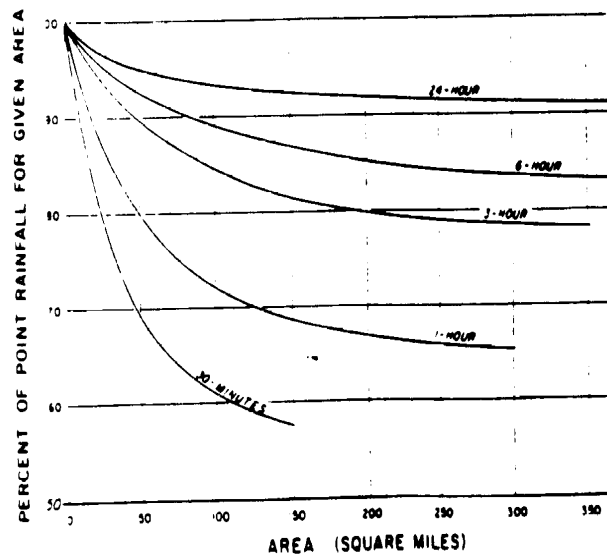


FIGURE 15.—Area-depth curves.

Appendix D.4