TITLE 35: ENVIRONMENTAL PROTECTION

SUBTITLE C: WATER POLLUTION

CHAPTER II: ENVIRONMENTAL PROTECTION AGENCY

PART 375
COMBINED SEWER OVERFLOW EXCEPTION CRITERIA AND FIRST FLUSH DETERMINATION

SUBPART A: INTRODUCTION

Section

SUBPART B: WATER QUALITY INVESTIGATION

SUBPART C: ASSESSMENT OF CONTROL OPTIONS

Section

SUBPART D: FIRST FLUSH DETERMINATION

AUTHORITY: Implementing Section 12(a) and authorized by Section 4 of the Environmental Protection Act (Ill. Rev. Stat. 1981, ch. 111 1/2, pars. 1012(a) and 1004) and by 35 Ill. Adm. Code 306.352.

SOURCE: Adopted and Codified at 7 Ill. Reg. 10808, effective August 23, 1983; amended at 8 Ill. Reg. 19436, effective September 26, 1984.

SUBPART A: INTRODUCTION

<BSection 375.101 Policy>>

This policy provides guidelines for:

a) Determination of water quality impacts attributable to combined sewer overflows and treatment plant bypasses;
b) Estimation of potential water quality improvements;
c) Selection of a combined sewer overflow (CSO) control program that can be justified on the basis of local environmental conditions and fiscal responsibility;
d) Evaluation and review of discharger's submittals pursuant to 35 Ill. Adm. Code 306.351; and
e) Determination of first flush as referenced in 35 Ill. Adm. Code 306.305(a).

(Source: Amended at 8 Ill. Reg. 19436, effective September 26, 1984.

<BSection 375.102 Definitions>>

All definitions in 35 Ill. Adm. Code 301 shall apply here. No incorporation by reference in this Part contains any later amendment or addition.

"Combined Sewer" means a sewer designed and constructed to receive both wastewater and land runoff.

"Dry Weather Flow" means the flowrate consisting of wastewater and non excessive sewer infiltration in the absence of inflow sources attributable to direct precipitation or snowmelt and is not restricted to meteorologic drought conditions. Nonexcessive sewer infiltration is defined at 40 CFR 35.2005(1984).

"First Flush" is defined as that volume of water and associated flow rate needed to carry solids or BOD concentrations is excess of the dry weather flow. This volume is shown on the "cross

hatched" area in Appendix A.

35 Ill. Adm. Code 306.305(a) uses the term "first flush to describe those flows requiring complete treatment. When sewage is flowing through a sewer system at fairly uniform lower velocities, which occur during dry weather conditions, some of the solids present in the waste are deposited in the pipes. In addition, solids and some organic material that may be washed into the combined sewer systems tend to build up on streets, parking lots, etc.

When a storm event occurs, the volume of wastewater carried by the sewer increases and the velocities in the sewer also increase. The high volume of storm water causes material to be washed from the streets into the sewer and the sludge deposited in the sewers to be scoured from the pipes. This material is carried to the sewage treatment plant where it exerts an additional organic load on the biological system and an additional solids load on the physical systems. The maximum impact of this phenonmenon tends to occur at the beginning of a storm event and taper off as the storm continues and there are no additional solids to remove.

"Human Contact Activities" means wading, swimming or any other activity involving partial or total immersion of the human body in the subject waterway whether for recreational or other purpose.

"Wet Weather Flow" means a flowrate condition, elevated above dry weather flow, attributable to land runoff as the result of snowmelt or a precipitation event.

(Source: Amended at 8 Ill. Reg. 19436, effective September 26, 1984)

<BSection 375.103 Prohibitions>>

a) Dry weather overflows are expressly prohibited under existing regulations and are not eligible for consideration under the provisions of this rule. Combined sewer overflow programs that will result in continued or future dry weather overflows or treatment plant bypasses will not be approved by the Agency.

b) This policy applies to overflow from combined sewer systems and treatment plant bypasses resulting from wet weather flow conditions. Overflows from separate sanitary sewers and from portions of combined sewer communities served by separate

sanitary sewers are not subject to this rule.

SUBPART B: WATER QUALITY INVESTIGATION

<BSection 375.201 Policy>>

It is the intent of this policy that water quality investigations be no more extensive than is necessary:

a) to identify the degree of CSO control appropriate for a specific community as mutually agreed to by discharger and Agency, and

b) to substantiate the appropriateness of the proposed control program under the scrutiny of the Board in a proceeding pursuant to 35 Ill. Adm. Code 306: Subpart D.

<BSection 375.202 Phase I - Background Information>>

a) A community seeking to pursue alternate CSO control requirements under provisions of 35 Ill. Adm. Code 306: Subpart D and this Part shall review existing documents including facility planning reports, sewer maintenance records, and Discharge Monitoring Reports to assemble pertinent background information. To the extent available in existing resources, pertinent background information shall include the following:

1) a map of the sewer system depicting:
   A) portions of the community served by combined sewers and separate sanitary sewers; and
   B) location of each overflow and receiving water body;
2) size of watershed of receiving water body at point of each overflow;
3) drainage area and population tributary to each overflow;
4) land use, zoning classification and projected growth patterns in the vicinity of each overflow using the following classifications: residential, commercial, industrial, recreational, agricultural;
5) actual or potential use of the affected waterway for human contact activities;
6) history of complaints regarding the stream and surrounding environment and downstream of overflows;
7) history of other complaints concerning the sewer system;
8) description of structural and physical condition of sewer system including age of system, incidence of sewer collapses, bottlenecks in the system; and

9) list of industrial and other sewer users tributary to overflows which contains substances in wastewater or storm drainage in concentrations likely to create hazardous or toxic conditions at the point of combined sewer overflow.

b) Submittals:

1) A written report of review conducted in subsection (a) above shall be submitted to the Agency along with a request for Agency participation on an advisory and review basis in a CSO impact/evaluation project.

2) Submittals shall be addressed to:

Illinois Environmental Protection Agency
Construction Grant Section
Division of Water Pollution Control
2200 Churchill Road
Springfield, Illinois 62706

c) Upon receipt and review of discharger's report, an Agency representative will be designated as project coordinator and contact person for the Agency's participation in the project. The Agency Project Coordinator will contact the Applicant's representative to schedule a conference regarding second phase activities.

d) After Phase I, conferences shall be held between the Agency and discharger's representatives to discuss and agree upon the nature and extent of each subsequent phase of investigation prior to commencing that phase.

<BSection 375.203 Phase II - Preliminary Stream Inspection>>

This phase requires a physical inspection of the receiving water body and near stream property. Additionally, any necessary elements missing from the Phase I background report shall be addressed in this step. Factors to be considered include:

a) Inspection of stream in and around vicinity of each overflow for sludge deposits, sewage related odors, floating debris of sanitary sewage origin, and any other visible signs of pollution impact. Inspection techniques shall be selected so as to assure maximum reliability of the results including:

1) probing, disturbance and extraction of bottom sediments in pools and other quiescent portions of stream to note color, texture, odor and other aspects of sediments that are indicative of sewage sludge:

2) estimates of extent and severity of sludge deposition in terms of depth of deposition, area of stream affected and

percentage of stream bed within affected area that contains sludge deposits; and

3) inspection of shoreline vegetation, logjams and other obstructions likely to retain floating sewage debris.

b) Stream Hydraulics:

1) Stream hydraulic factors shall be identified including: average width of stream channel from bank to bank, height of stream banks above thalweg, stream bed gradient.

2) For receiving streams with a 7Q10 (average seven day low flow which occurs once in 10 years) flow greater than 10 cubic feet per second this information can be omitted, substituting the 7Q10 value.

c) Stream morphological factors including:

1) substrate type;

2) variation of structure via natural meandering, pool and riffle sequence;

3) degree of dredging, channelization or other alteration of natural stream character; and

4) accumulation of logjams and other naturally occurring vegetative debris.

d) Description of stream side property including:

1) topography;

2) land cover including forrested, agricultural row crop, marsh, grass buffer strip, residential lawn, and

3) land use if not already identified in Section 375.202(a)(4) including a specific determination if affected area is utilized by or accessible to children for recreational activities.

<BSection 375.204 Phase III - Detailed Water Quality Evaluation>>

Areas to be addressed in a detailed water quality survey shall include, consistent with 35 Ill. Adm. Code 306.361 (d):

a) water column chemistry -

1) upstream/downstream and overflow sampling;

2) wet weather/dry weather sampling;

3) diurnal sampling for dissolved oxygen (D.O.);

4) parameters generally will include BOD5, suspended solids, volatile suspended solids, ammonia. Other parameters may become important depending on the nature of the overflow; and

5) other parameters as deemed appropriate relative to 35 Ill. Adm. Code 375.302(a)(8).

b) sediment analysis -
   1) sediment oxygen demand;
   2) percent volatile matter;
   3) particle size distribution; and
   4) other parameters as deemed appropriate relative to 35 Ill. Adm. Code 375.302(a)(8).

c) biological survey -
   1) benthic macroinvertebrates;
   2) fishes; and
   3) plant productivity assessment (algal blooms).

d) hydraulic and hydrologic factors including storm hydrographs for receiving stream and overflow.

<BSection 375.205 Special Analysis for Congested Areas>>

In small drainage basins receiving combined sewer overflows from collection systems belonging to several separate governing bodies the significance of the aggregate CSO load may well dictate a basin wide evaluation of alternate control levels in lieu of community by community evaluation. Resolution of CSO issues in such basins may require evaluation of all CSO sources concurrently with cooperative data collection efforts involving several communities. This is especially applicable in major metropolitan areas.

<BSection 375.206 Time Schedule>>

a) Once a water quality investigation is initiated, every effort shall be made to expedite each step of the activity, completing the investigation in the shortest possible time without compromising the validity of the findings. Effective field activities are dependent upon proper seasonal, hydrologic and meteorologic conditions which will require flexibility in scheduling. Nevertheless the following time table is suggested as a general guideline.

b) Phase I - 30 to 60 days for completion plus 30 to 60 days for Agency review and planning of Phase II.

c) Phase II - 30 to 60 days for completion plus 30 to 60 days for Agency review and planning of Phase III.

d) Phase III - 6 months to 1 year and generally containing the summer months of June, July and August.

SUBPART C: ASSESSMENT OF CONTROL OPTIONS

<BSection 375.301 Water Quality Evaluation>>

It is intended that water quality evaluation performed under Subpart C of this Part will be undertaken in conjunction with or subsequent to first flush analysis and CSO studies consistent with Subpart D. Control options being evaluated shall not be limited to alternatives resulting in full compliance with 35 Ill. Adm. Code 306.305; lesser control options of varying degrees shall be evaluated also.

(Source: Amended at 8 Ill. Reg. 19436, effective September 26, 1984)

<BSection 375.302 Control Alternatives>>

Alternatives resulting in noncompliance with existing water quality standards and requiring regulatory relaxation of water quality standards may also be considered by the discharger. Water quality revisions being considered shall be consistent with the purpose and objectives of the Act and the CWA.

<BSection 375.303 Benefits Assessment>>

Benefits shall not be assessed solely on a pound pollutant removed basis but also on instream improvement of a documented pollutional impact or reduction in a public health risk. Acceptable techniques for estimating water quality improvements will vary depending on individual circumstances but may include:

a) consideration of receiving water body assimilative capabilities and strategic relocation of overflows;

b) selection of size of storm to design controls for based on stream hydrograph, available dilution, turbulance and velocity under storm conditions and their affect on assimilation (since CSO's are dominated by suspended rather than soluble pollutants, major emphasis will be placed on prevention of instream deposition); and

c) mathematic modeling.

SUBPART D: FIRST FLUSH DETERMINATION

<BSection 375.401 Variables in First Flush Determination>>

The intensity and duration of first flush are a function of certain variables including:

a) Physical and hydraulic features of the sewer system and tributary watershed.
b) Amount of sediment accumulated in the sewer system and on impervious surfaces of the watershed.
c) Intensity and duration of the storm event causing the flushing.

(Source: Added at 8 Ill. Reg. 19436, effective September 26, 1984)

<BSection 375.402 Conditions for Determination>>

For any given sewer system, or portion of a sewer system, first flush volume subject to full treatment requirements of 35 Ill. Adm. Code 306.305(a) and associated flow rate shall be determined for the following condition(s):

a) A storm of 1.2 inch per hour intensity with a duration of 60 minutes, which approximates a one year-one-hour storm for most sections of the state.
b) There shall be sufficient time between the storm event chosen to determine first flush and any previous event to allow for adequate solids deposition in the sewers and on the streets to demonstrate first flush under this Part. In general a ten day period should be sufficient.

(Source: Added at 8 Ill. Reg. 19436, effective September 26, 1984)

<BSection 375.403 Field Studies>>

a) First flush volumes may be determined through direct field measurement at a point of overflow, modeling of the collection system or equally accurate techniques. Either approach is dependent on a field monitoring program as described in (c) below. Commonly, first flush for the design storm is determined by direct measurement of flush rate and volume for several storms of varying intensity and extrapolating to the design storm (1.2 in/hr.).
b) Detailed monitoring may be limited to less than the total number of overflow locations in the system when monitoring all locations would be impossible or would not be helpful in demonstrating the capabilities of the system. Sampling sites should be selected in order to monitor the largest discharges in terms of loading. Consideration shall also be given to the different land use patterns, population densities, and sewer system characteristics tributary to a given overflow site within the study area.
c) General guidance for field measurement includes:

1) A minimum of 3 storms should be monitored for each sampling site.
2) There shall be a least one rain gauge located within the study area. For systems serving an area of over 2 squares miles, multiple gauges shall be used and located to achieve gauge spacing of 2 miles or less throughout the study area. Rain gauges should be on the continuous recording type, otherwise manual readings should be recorded on intervals of 10 minutes or less. If only one gauge is used it should be located near the center of the study area; multiple gauges shall be located so as to identify variations in storm intensity across the study area.
3) Flow monitoring shall be initiated at the onset of a storm and continue through and beyond the sewer flushing period. Flow meters may be located in interceptor manholes, diversion structures, outfall sewers or other locations where dependale opertion is assured. Caution should be taken to protect instrumentation from flooding, corrosion, excess humidity, vandalism or other factors which jeopardize either the equipment or reliability of the data.
4) Water samples should be collected at the onset of the storm and at 10 or 15 minute intervals thereafter. In most instances a moderate to heavy storm will fully flush the system within two hours. Most automatic discrete samplers have adequate capacity to contain the entire flush period with 10 minutes sampling frequency. Again, caution should be taken to protect against flooding, corrosion, or excess humidity that may cause malfunctioning or failure of the mechanical or electronic components of the sampler. Samples should be analyzed for BOD as defined in 35 Ill. Adm. Code 304.120(a), total and volatile suspended solids with sample preservation, and analysis consistent with Standard Methods 15th Edition (1980).
5) Overflow points that are not subject to direct flow and quality monitoring should be inspected during the storm period to determine if the overflows are functioning and to estimate the rate and duration of overflow.

(Source: Added at 8 Ill. Reg. 19436, effective September 26, 1984)

<BSection 375.404 Modeling>>

a) If all of the overflow locations to be studied cannot be sampled

and monitored, or field conditions were not available through direct field measurement as described in Section 375.403, then other methods, including modeling of section (s) of the study area, shall be required to determine first flush. These methods should be used to:

1) Predict the quality and quantity of loads and concentrations.
2) Identify significant sources.
3) Analyze hydraulics of the tributary system.

b) Data supplied for the modeling must be based on factors particular to a given system or study area and should include:

1) Rainfall data
2) Size of drainage area
3) Land use
4) Population density
5) Hydraulics of area
6) Percentage of combined and/or separate sewers

c) The type of modeling to be used for a given collection system or study area shall be addressed in the Plan of Study for the CSO Analysis. References, such as texbooks, technical papers, etc., for the modeling methods to be used shall be listed.

d) Verification that the model(s) is valid shall be provided by comparing the output obtained from the model(s) with actual sampling and monitoring data from overflow points specified in accordance with Section 375. 403 for two or more storms.

(Source: Added at 8 Ill. Reg. 19436, effective September 26, 1984)

<BSection 375.APPENDIX A First Flush Graph>>