PRETREATMENT 101

CONTINUING EDUCATION
PROFESSIONAL DEVELOPMENT COURSE

Technical
Learning
College

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Professional Engineers; Most states will accept our courses for credit but we do not officially list the States or Agencies acceptance or approvals.

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Contributing Editors

James L. Six Received a Bachelor of Science Degree in Civil Engineering from the University of Akron in June of 1976, Registered Professional Engineer in the State of Ohio, Number 45031 (Retired), Class IV Water Supply Operator issued by Ohio EPA, Number WS4-1012914-08, Class II Wastewater Collection System Operator issued by Ohio EPA, Number WC2-1012914-94

Joseph Camerata has a BS in Management with honors (magna cum laude). He retired as a Chemist in 2006 having worked in the field of chemical, environmental, and industrial hygiene sampling and analysis for 40 years.

James Bevan, Water Quality Inspector S.M.E. Twenty years of experience in the environmental field dealing with all aspects of water regulations on the federal, state, and local levels. Teacher and Proctor in Charge for Backflow Certification Testing at the ASETT Center in Tucson for the past 15 years and possess an Arizona Community College, Special Teaching Certificate in Environmental Studies.

Dr. Pete Greer S.M.E., Retired biology instructor, chemistry and biological review.

Jack White, Environmental, Health, Safety expert, City of Phoenix. Art Credits.

Some States and many employers require the final exam to be proctored.

Do not solely depend on TLC's Approval list for it may be outdated.

Most of our students prefer to do the assignment in Word and e-mail or fax the assignment back to us. We also teach this course in a conventional hands-on class. Call us and schedule a class today.

Responsibility

This course contains EPA's federal rule requirements. Please be aware that each state implements drinking water/wastewater/safety regulations that may be more stringent than EPA's or OSHA's regulations. Check with your state environmental agency for more information. You are solely responsible in ensuring that you abide with your jurisdiction or agency's rules and regulations.

Important Information about this Manual

This manual has been prepared to help students gain or increase awareness of the Environmental Protection Agency's Rules and Regulation relating to Title 40 Code of Federal Regulations, Part 403, "*General Pretreatment Regulations for Existing and New Sources of Pollution*," and other applicable State and Federal laws, including but not limited to, the Clean Water Act, Industrial pretreatment 40 CFR. This course will cover the fundamentals and basic requirements of the federal rule concerning the national pretreatment rule, POTW, wastewater sampling and reporting information.

The scope of the material is quite large, requiring a major effort to bring it under control. Employee health and safety, as well as that of the public, depends upon careful application of federal and state regulations and safe working procedures.

This manual will cover federal laws, regulations, required procedures and work rules relating to general pretreatment and wastewater sampling. It should be noted, however, that the federal and state regulations are an ongoing process and subject to change over time. For this reason, a list of resources is provided to assist in obtaining the most up-to-date information on various subjects and regulations

This manual is an educational document for employees who are involved with water quality and pollution control. It is not designed to meet the full requirements of the United States Environmental Protection Agency (EPA) or the Department of Labor-Occupational Safety and Health Administration (OSHA), or your State pretreatment rules and regulations. This course manual will provide general guidance and should not be used as a basis for developing general pretreatment, enforcement, reporting or wastewater sampling plans. This document is not a detailed pretreatment, pollution control, pollution prevention, wastewater treatment textbook or a comprehensive source book on water/wastewater rules and regulations.

Technical Learning College or Technical Learning Consultants, Inc. makes no warranty, guarantee or representation as to the absolute correctness or appropriateness of the information in this manual and assumes no responsibility in connection with the implementation of this information. It cannot be assumed that this manual contains all measures and concepts required for specific conditions or circumstances.

This document should be used for education and is not considered a legal document. Individuals who are responsible for pretreatment programs and/or water/wastewater sampling and the health and safety of workers at hazardous waste sites should obtain and comply with the most recent federal, state, and local regulations relevant to these sites and are urged to consult with OSHA, the EPA and other appropriate federal, state and local agencies.

In this photo, the Lab Tech is waiting for the Sampler to return with samples. You can see the small refrigerator with a lock on it. Samplers will normally release the samples to the Chemist, but if the Chemist is out of the office, or after work hours, you will place the samples in the refrigerator and lock it. Write on your chain-of-custody report that you placed the samples in the locked refrigerator.

Chain-of-Custody (COC)
A record of each person involved in the possession of a sample from the person who collects the sample to the person who analyzes the sample in the laboratory.

PRETREATMENT

The term **"pretreatment"** means the treatment of wastewater by commercial and industrial facilities to remove harmful pollutants before being discharged to a sewer system under the control of a publicly owned treatment works (POTWs). "Pretreatment" is also defined in **Title 40 Code of Federal Regulations (40 CFR) Subsection 403.**

Technical Learning College

Technical Learning College's Scope and Function

Welcome to the Program,

Technical Learning College (TLC) offers affordable continuing education for today's working professionals who need to maintain licenses or certifications. TLC holds several different governmental agency approvals for granting of continuing education credit.

TLC's delivery method of continuing education can include traditional types of classroom lectures and distance-based courses or independent study. TLC's distance based or independent study courses are offered in a print - based distance educational format. We will beat any other training competitor's price for the same CEU material or classroom training.

Our courses are designed to be flexible and for you do finish the material on your leisure. Students can also receive course materials through the mail. The CEU course or e-manual will contain all your lessons, activities and instruction to obtain the assignments. All of TLC's CEU courses allow students to submit assignments using e-mail or fax, or by postal mail. (See the course description for more information.)

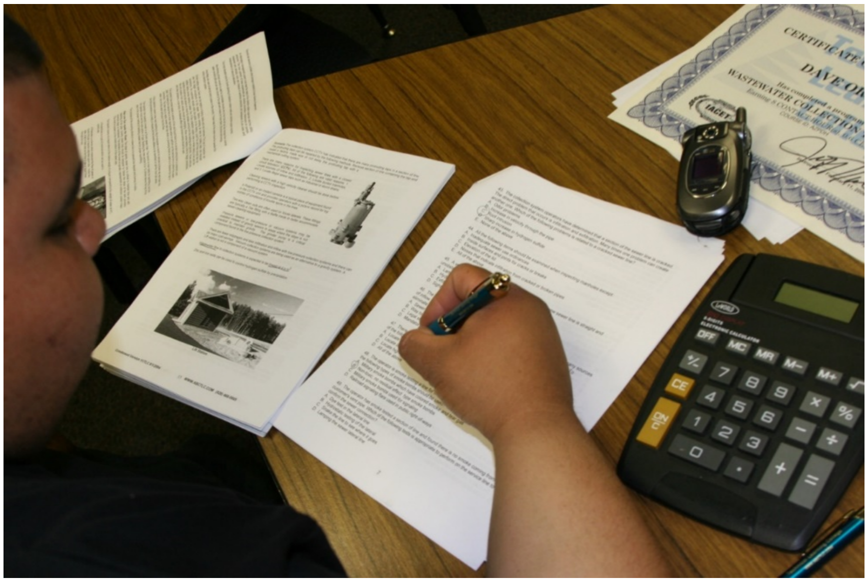
Students have direct contact with their instructor—primarily by e-mail or telephone. TLC's CEU courses may use such technologies as the World Wide Web, e-mail, CD-ROMs, videotapes and hard copies. (See the course description.) Make sure you have access to the necessary equipment before enrolling, i.e., printer, Microsoft Word and/or Adobe Acrobat Reader. Some courses may require proctored closed-book exams depending upon your state or employer requirements.

Flexible Learning
At TLC, there are no scheduled online sessions or passwords you need contend with, nor are you required to participate in learning teams or groups designed for the "typical" younger campus based student. You can work at your own pace, completing assignments in time-frames that work best for you. TLC's method of flexible individualized instruction is designed to provide each student the guidance and support needed for successful course completion.

Course Structure
TLC's online courses combine the best of online delivery and traditional university textbooks. You can easily find the course syllabus, course content, assignments, and the post-exam (Assignment). This student friendly course design allows you the most flexibility in choosing when and where you will study.

Classroom of One
TLC offers you the best of both worlds. You learn on your own terms, on your own time, but you are never on your own. Once enrolled, you will be assigned a personal Student Service Representative who works with you on an individualized basis throughout your program of study. Course specific faculty members (S.M.E.) are assigned at the beginning of each course providing the academic support you need to successfully complete each course. Please call or email us for assistance.

Satisfaction Guaranteed
We have many years of experience, dealing with thousands of students. We assure you, our customer satisfaction is second to none. This is one reason we have taught more than 20,000 students.



We welcome you to do the electronic version of the assignment and submit the answer key and registration to us either by fax or e-mail. If you need this assignment graded and a certificate of completion within a 48-hour turn around, prepare to pay an additional rush charge of $50.

Contact Numbers

Fax (928) 468-0675
Email Info@tlch2o.com
Telephone (866) 557-1746

CEU Course Description

PRETREATMENT 101 CEU TRAINING COURSE

Intended Audience
Stormwater Inspectors, Wastewater Treatment Operators, Pretreatment and Industrial Waste Inspectors--the target audience for this course is the person interested in working in the stormwater/pretreatment field. This course was designed for the pretreatment inspector or for the wastewater treatment/wastewater collection operator who performs various pretreatment related job duties. This course is also for operators wishing to maintain CEUs for certification license, wanting to learn how to do the job safely and effectively, and/or to meet education needs for promotion. This CEU Course will review the Environmental Protection Agency's Rules and Regulation relating to Title 40 Code of Federal Regulations, Part 403, "*General Pretreatment Regulations for Existing and New Sources of Pollution*," and other applicable State and Federal laws, including but not limited to, the Clean Water Act and the Industrial Pretreatment 40 CFR. This course will cover the fundamentals and basic requirements of the Federal rule concerning the National Pretreatment Rule, POTW, wastewater sampling and reporting information.

Final Examination for Credit
Opportunity to pass the final comprehensive examination is limited to three attempts per course enrollment.

Course Procedures for Registration and Support
All of Technical Learning College's distance learning courses have complete registration and support services offered. Delivery of services will include, e-mail, web site, telephone, fax and mail support. TLC will attempt immediate and prompt service.

When a student registers for a distance or correspondence course, he/she is assigned a start date and an end date. It is the student's responsibility to note dates for assignments and keep up with the course work. If a student falls behind, he/she must contact TLC and request an end date extension in order to complete the course. It is the prerogative of TLC to decide whether to grant the request. All students will be tracked by a unique number assigned to the student.

Instructions for Written Assignments
The Pretreatment 101 CEU Training course uses a multiple-choice style answer key.

Feedback Mechanism (examination procedures)
Each student will receive a feedback form as part of his or her study packet. You will find this form in the rear of the course or lesson.

Security and Integrity
All students are required to do their own work. All lesson sheets and final exams are not returned to the student to discourage sharing of answers. Any fraud or deceit and the student will forfeit all fees and the appropriate agency will be notified.

Grading Criteria
TLC will offer the student either pass/fail or a standard letter grading assignment. If TLC is not notified, you will only receive a pass/fail notice.

Required Texts
The Pretreatment 101 CEU Training course comes complete with the Environmental Protection Agency's Rules and Regulation relating to Title 40 Code of Federal Regulations, Part 403, "General Pretreatment Regulations for Existing and New Sources of Pollution," and other applicable State and Federal laws, including but not limited to, the Clean Water Act and Industrial Pretreatment 40 CFR.

This course will cover the fundamentals and basic requirements of the federal rule concerning pretreatment, POTW, SIU responsibilities, wastewater sampling and reporting information.

Recordkeeping and Reporting Practices
TLC will keep all student records for a minimum of seven years. It is the student's responsibility to give the completion certificate and any other forms to the appropriate agencies. TLC will not release any records to any other party.

ADA Compliance
TLC will make reasonable accommodations for persons with documented disabilities. Students should notify TLC and their instructors of any special needs. Course content may vary from this outline to meet the needs of this particular group.

Mission Statement
Our only product is educational service. Our goal is to provide you with the best possible education service possible. TLC will attempt to make your learning experience an enjoyable opportunity.

Educational Mission
The educational mission of TLC is:
To provide TLC students with comprehensive and ongoing training in the theory and skills needed for the environmental education field,

To provide TLC students with opportunities to apply and understand the theory and skills needed for operator certification,

To provide opportunities for TLC students to learn and practice environmental educational skills with members of the community for the purpose of sharing diverse perspectives and experience,

To provide a forum in which students can exchange experiences and ideas related to environmental education,

To provide a forum for the collection and dissemination of current information related to environmental education, and to maintain an environment that nurtures academic and personal growth.

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In this photo, the Chemist is waiting for the Sampler to return with samples. You can see the small refrigerator with a lock on it. Samplers will normally release the samples to the Chemist, but if the Chemist is out of the office, or after work hours, you will place the samples in the refrigerator and lock it. Write that you placed the samples in the locked refrigerator on your chain-of-custody report.

Chain-of-Custody (COC)
A record of each person involved in the possession of a sample from the person who collects the sample to the person who analyzes the sample in the laboratory.

Preface

The industrial boom in the United States during the 1950s and 60s brought with it a level of pollution never before seen in this country. Scenes of dying fish, burning rivers, and thick black smog engulfing major metropolitan areas were images and stories repeated regularly on the evening news. In December of 1970, the President of the United States created the U.S. Environmental Protection Agency (**EPA**) through an executive order in response to these critical environmental problems.

In 1972, Congress passed the Clean Water Act (**CWA**) to restore and maintain the integrity of the nation's waters. Although prior legislation had been enacted to address water pollution, those previous efforts were developed with other goals in mind. For example, the 1899 Rivers and Harbors Act protected navigational interests while the 1948 Water Pollution Control Act and the 1956 Federal Water Pollution Control Act merely provided limited funding for State and local governments to address water pollution concerns on their own.

The CWA required the elimination of the discharge of pollutants into the nation's waters and the achievement of fishable and swimmable water quality levels. The EPA's National Pollutant Discharge Elimination System (**NPDES**) Permitting Program represents one of the key components established to accomplish this feat.

The NPDES program requires that all point source discharges to waters of the U.S. (i.e., "***direct discharges***") must be permitted. To address ***"indirect discharges***" from industries to Publicly Owned Treatment Works (**POTWs**), the EPA, through CWA authorities, established the National Pretreatment Program as a component of the NPDES Permitting Program. The National Pretreatment Program requires industrial and commercial dischargers to treat or control pollutants in their wastewater prior to discharge to POTWs.

In 1986, more than one-third of all toxic pollutants entered the nation's waters from publicly owned treatment works (**POTWs**) through industrial discharges to public sewers. Certain industrial discharges, such as slug loads, can interfere with the operation of POTWs, leading to the discharge of untreated or inadequately treated wastewater into rivers, lakes, etc. Some pollutants are not compatible with biological wastewater treatment at POTWs and may pass through the treatment plant untreated.

This "**pass through**" of pollutants impacts the surrounding environment, occasionally causing fish kills or other detrimental alterations of the receiving waters. Even when POTWs have the capability to remove toxic pollutants from wastewater, these toxins can end up in the POTW's sewage sludge, which in many places is land applied to food crops, parks, or golf courses as fertilizer or soil conditioner.

The National Pretreatment Program is unique in that the General Pretreatment Regulations require all large POTWs (i.e., those designed to treat flows of more than 5 million gallons per day) and smaller POTWs with significant industrial discharges to establish local pretreatment programs. These local programs must enforce all national pretreatment standards and requirements in addition to any more stringent local requirements necessary to protect site-specific conditions at the POTW.

More than 1,500 POTWs have developed and are implementing local pretreatment programs designed to control discharges from approximately 30,000 significant industrial users.

Since 1983, the Pretreatment Program has made great strides in reducing the discharge of toxic pollutants to sewer systems and to waters of the U.S. In the eyes of many, the Pretreatment Program, implemented as a partnership between the EPA, States, and POTWs, is a notable success story in reducing impacts to human health and the environment. These strides can be attributed to the efforts of many Federal, State, local, and industrial representatives who have been involved with developing and implementing the various aspects of the Pretreatment Program.

The EPA has supported the Pretreatment Program through development of numerous guidance manuals. The EPA has released more than 30 manuals that provide guidance to the EPA, States, POTWs, and industry on various pretreatment program requirements and policy determinations. Through the EPA's guidance, the Pretreatment Program has maintained national consistency in interpretation of the regulations. Nevertheless, turnover in pretreatment program staff has diluted historical knowledge, leaving new staff and other interested parties unaware of existing materials.

The intent of this correspondence course, ***Pretreatment 101***, is to:
(1) provide a reference for anyone interested in understanding the basics of pretreatment program requirements, *and*
(2) provide a roadmap to additional and more detailed guidance materials for those trying to implement specific elements of the Pretreatment Program.

While the Pretreatment Program has demonstrated significant reductions in pollutants discharged to POTWs, Congress' goals of zero discharge of toxic pollutants and fishable/swimmable water quality have not been realized. The EPA is currently working to establish more cost-effective and common sense approaches to environmental protection (e.g., using watershed, streamlining, and reinvention concepts), creating new responsibilities for all those involved in the National Pretreatment Program. Many current challenges remain, while many new ones likely lie ahead.

This course is intended to provide an understanding of the basic concepts that drive the Program, the current status of the Program and program guidance, and an insight into what the future holds for all those involved with implementing the Pretreatment Program.

Two lab techs examine various samples, including QA/QC and Trip Blanks to ensure both sample integrity and lab equipment/sample equipment quality.

List of Pretreatment Acronyms Used in this Course

Acronym	Full Phrase
AA	Approval Authority
AO	Administrative Order
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practices
BMR	Baseline Monitoring Report
BOD5	5-day Biochemical Oxygen Demand
BPJ	Best Professional Judgment
BPT	Best Practicable Control Technology Currently Available
CA	Control Authority
CFR	Code of Federal Regulations
CIU	Categorical Industrial User
CSO	Combined Sewer Overflow
CWA	Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117, and Pub. L. 100-4, 33 U.S.C. 1251 et seq.
CWF	Combined Wastestream Formula
CWT	Centralized Waste Treater
DMR	Discharge Monitoring Report
DSE	Domestic Sewage Exclusion
DSS	Domestic Sewage Study
ELG	Effluent Limitations Guideline
EPA	Environmental Protection Agency
EPCRA	Emergency Preparedness and Community Right to Know Act
ERP	Enforcement Response Plan
FDF	Fundamentally Different Factors
FR	Federal Register
FWA	Flow Weighted Average
gpd	Gallons per Day
IU	Industrial User
LEL	Lower Explosive Limit
MAHL	Maximum Allowable Headworks Loading
MAIL	Maximum Allowable Industrial Loading
MGD	Million Gallons per Day
MSDS	Material Safety Data Sheet
NAICS	North American Industry Classification System (replaces SIC coding in 1998)
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
NSPS	New Source Performance Standard

O&G	Oil and Grease
O&M	Operations and Maintenance
OCPSF	Organic Chemicals, Plastics, and Synthetic Fibers
P2	Pollution Prevention
PCI	Pretreatment Compliance Inspection
PCS	Permit Compliance System
PIRT	Pretreatment Implementation Review Task Force
POTW	Publicly Owned Treatment Works
PSES	Pretreatment Standards for Existing Sources
PSNS	Pretreatment Standards for New Sources
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
SIC	Standard Industrial Classification
SIU	Significant Industrial User
SPCC	Spill Prevention Control and Countermeasures
SNC	Significant Noncompliance
SSO	Sanitary Sewer Overflow
SUO	Sewer Use Ordinance
TCLP	Toxicity Characteristic Leaching Procedure
TIE	Toxicity Identification Evaluation
TOMP	Toxic Organic Management Program
TRE	Toxicity Reduction Evaluation
TRI	Toxic Release Inventory
TSS	Total Suspended Solids
TTO	Total Toxic Organics
USC	United States Code
UST	Underground Storage Tank
WET	Whole Effluent Toxicity
WWTP	Wastewater Treatment Plant

Glossary of Regulatory Terms

This glossary includes a collection of terms used in this course and an explanation of each term.

Act or "the Act" *[40 CFR §403.3(b)]*
The Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 USC 1251*et.seq.*

Approval Authority *[40 CFR §403.3(c)]*
The Director in an NPDES State with an approved State Pretreatment Program and the appropriate EPA Regional Administrator in a non-NPDES State or State without an approved pretreatment program.

Approved POTW Pretreatment Program or Program *[40 CFR §403.3(d)]*
A program administered by a POTW that meets the criteria established in 40 CFR Part 403 and which has been approved by a Regional Administrator or State Director.

Approved State Pretreatment Program
A program administered by a State that meets the criteria established in 40 CFR §403.10 and which has been approved by a Regional Administrator

Approved/Authorized State
A State with an NPDES permit program approved pursuant to section 402(b) of the Act and an approved State Pretreatment Program.

Baseline Monitoring Report (BMR) *[paraphrased from 40 CFR §403.12(b)]*
A report submitted by categorical industrial users (CIUs) within 180 days after the effective date of an applicable categorical standard, or at least 90 days prior to commencement of discharge for new sources, which contains specific facility information, including flow and pollutant concentration data. For existing sources, the report must also certify as to the compliance status of the facility with respect to the categorical standards.

Best Available Technology Economically Achievable (BAT)
A level of technology based on the best existing control and treatment measures that are economically achievable within the given industrial category or subcategory.

Best Management Practices (BMPs)
Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the U.S. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Best Practicable Control Technology Currently Available (BPT)
A level of technology represented by the average of the best existing wastewater treatment performance levels within an industrial category or subcategory.

Best Professional Judgment (BPJ)
The method used by a permit writer to develop technology-based limitations on a case-by-case basis using all reasonably available and relevant data.

Blowdown
The discharge of water with high concentrations of accumulated solids from boilers to prevent plugging of the boiler tubes and/or steam lines. In cooling towers, blowdown is discharged to reduce the concentration of dissolved salts in the recirculating cooling water.

Bypass *[40 CFR §403.17(a)]*
The intentional diversion of wastestreams from any portion of an Industrial User's treatment facility.

Categorical Industrial User (CIU)
An industrial user subject to National categorical pretreatment standards.

Categorical Pretreatment Standards *[40 CFR § 403.6 and 40 CFR Parts 405-471*]
Limitations on pollutant discharges to POTWs promulgated by the EPA in accordance with Section 307 of the Clean Water Act, that apply to specific process wastewater discharges of particular industrial categories.

Chain of Custody (COC)
A record of each person involved in the possession of a sample from the person who collects the sample to the person who analyzes the sample in the laboratory.

Chronic
A stimulus that lingers or continues for a relatively long period of time, often one-tenth of the life span or more. Chronic should be considered a relative term depending on the life span of an organism. The measurement of chronic effect can be reduced growth, reduced reproduction, etc., in addition to lethality.

Clean Water Act (CWA)
The common name for the Federal Water Pollution Control Act. Public law 92-500; 33 U.S.C. 1251 et seq.; legislation which provides statutory authority for both NPDES and Pretreatment Programs.

Code of Federal Regulations (CFR)
A codification of Federal rules published annually by the Office of the Federal Register National Archives and Records Administration. Title 40 of the CFR contains the regulations for *Protection of the Environmen*t.

Combined Sewer Overflow (CSO)
A discharge of untreated wastewater from a combined sewer system at a point prior to the headworks of a publicly owned treatment works. CSOs generally occur during wet weather (rainfall or snowfall). During periods of wet weather, these systems become overloaded, bypass treatment works, and discharge directly to receiving waters.

Combined Wastestream Formula (CWF) *[paraphrased from 40 CFR §403.6(e)]*
Procedure for calculating alternative discharge limits at industrial facilities where a regulated wastestream from a categorical industrial user is combined with other wastestreams prior to treatment.

Compliance Schedule
A schedule of remedial measures included in a permit or an enforcement order, including a sequence of interim requirements (for example, actions, operations, or milestone events) that lead to compliance with the CWA and regulations.

Composite Sample
Sample composed of two or more discrete samples. The aggregate sample will reflect the average water quality covering the compositing or sample period.

Concentration-based Limit
A limit based upon the relative strength of a pollutant in a wastestream, usually expressed in mg/l.

Continuous Discharge
A discharge that occurs without interruption during the operating hours of a facility, except for infrequent shutdowns for maintenance, process changes or similar activities.

Control Authority *[paraphrased from 40 CFR § 403.12(a)]*
A POTW with an approved pretreatment program or the approval authority in the absence of a POTW pretreatment program.

Conventional Pollutants
BOD, TSS, fecal coliform, oil and grease, and pH

Daily Maximum Limitations
The maximum allowable discharge of pollutants during a 24-hour period. Where daily maximum limitations are expressed in units of mass, the daily discharge is the total mass discharged over the course of the day. Where daily maximum limitations are expressed in terms of a concentration, the daily discharge is the arithmetic average measurement of the pollutant concentration derived from all measurements taken that day.

Detection Limit
The minimum concentration of an analyte(substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure set forth in 40 CFR Part 136, Appendix B.

Development Document
Detailed report of studies conducted by the U.S. EPA for the purpose of establishing effluent guidelines and categorical pretreatment standards.

Dilute Wastestream *[paraphrased from 40 CFR §403.6(e)(1)(i)]*
For purposes of the combined wastestream formula, the average daily flow (at least a 30-day average) from : (a) boiler blowdown streams, non-contact cooling streams, storm water streams, and demineralized backwash streams; provided, however, that where such streams contain a significant amount of a pollutant, and the combination of such streams, prior to treatment, with an industrial user's regulated process wastestream(s) will result in a substantial reduction of that pollutant, the Control Authority, upon application of the industrial user, may exercise its discretion to determine whether such stream(s) should be classified as diluted or unregulated. In its application to the Control Authority, the industrial user must provide engineering, production, sampling and analysis, and such other information so the control authority can make its determination; or (b) sanitary wastestreams where such streams are not regulated by a categorical pretreatment standard; or (c) from any process wastestreams which were, or could have been, entirely exempted from categorical pretreatment standards pursuant to paragraph 8 of the NRDC v. Costle Consent
Decree (12 ERC 1833) for one more of the following reasons (see Appendix D of 40 CFR Part 403):
a. the pollutants of concern are not detectable in the effluent from the industrial user (paragraph(8)(a)(iii));
b. the pollutants of concern are present only in trace amounts and are neither causing nor likely to cause toxic effects (paragraph (8)(a)(iii));
c. the pollutants of concern are present in amounts too small to be effectively deduced by technologies known to the Administrator (paragraph (8)(a)(iii)); or
d. the wastestream contains only pollutants which are compatible with the POTW (paragraph (8)(b)(I)).

Effluent Limitations Guideline
Any effluent limitations guidelines issued by the EPA pursuant to Section 304(b) of the CWA. These regulations are published to adopt or revise a national standard prescribing restrictions on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources, in specific industrial categories (e.g., metal finishing, metal molding and casting, etc).

Enforcement Response Plan *[paraphrased from 40 CFR §403.8(f)(5)]*
Step-by-step enforcement procedures followed by Control Authority staff to identify, document, and respond to violations.

Existing Source
Any source of discharge, the construction or operation of which commenced prior to the publication by the EPA of proposed categorical pretreatment standards, which will be applicable to such source if the standard is thereafter promulgated in accordance with Section 307 of the Act.

Federal Water Pollution Control Act (FWPCA)
The title of Public law 92-500; 33 U.S.C. 1251 et seq., also known as the Clean Water Act (CWA),enacted October 18, 1972.

Flow Weighted Average Formula (FWA) *[paraphrased from 40 CFR §403.6(e)]*
A procedure used to calculate alternative limits where wastestreams regulated by a categorical pretreatment standard and nonregulated wastestreams combine after treatment but prior to the monitoring point.

Flow Proportional Composite Sample
Combination of individual samples proportional to the flow of the wastestream at the time of sampling.

Fundamentally Different Factors *[paraphrased from 40 CFR §403.13]*
Case-by-case variance from categorical pretreatment standards based on the factors considered by the EPA in developing the applicable category/subcategory being fundamentally different than factors relating to a specific industrial user.

General Prohibitions *[40 CFR §403.5(a)(1)]*
No user shall introduce into a POTW any pollutant(s) which cause pass through or interference.

Grab Sample
A sample which is taken from a wastestream on a one-time basis with no regard to the flow of the wastestream and without consideration of time. A single grab sample should be taken over a period of time not to exceed 15 minutes.

Indirect Discharge or Discharge *[40 CFR §403.3(g)]*
The introduction of pollutants into a POTW from any non-domestic source regulated under section 307(b), (c), or (d) of the Act.

Industrial User (IU) or User *[40 CFR §403.3(h)]*
A source of indirect discharge.

Industrial Waste Survey
The process of identifying and locating industrial users and characterizing their industrial discharge.

Inhibition Concentration
Estimate of the toxicant concentration that would cause a given percent reduction (e.g., IC25) in a nonlethal biological measurement of the test organisms, such as reproduction or growth.

Interference *[paraphrased from 40 CFR §403.3(i)]*
A discharge which, alone or in conjunction with a discharge or discharges from other sources, both: (1)inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and (2) therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with ... [applicable] statutory provisions and regulations or permits issued there under (or more stringent State or local regulations)

Local Limits *[paraphrased 40 CFR § 403.5(c)]*
Specific discharge limits developed and enforced by POTWs upon industrial or commercial facilities to implement the general and specific discharge prohibitions listed in 40 CFR §§403.5(a)(1) and (b).

Monthly Average
The arithmetic average value of all samples taken in a calendar month for an individual pollutant parameter. The monthly average may be the average of all grab samples taken in a given calendar month, or the average of all composite samples taken in a given calendar month.

National Pollutant Discharge Elimination System (NPDES)
The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing discharge permits from point sources to waters of the United States, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the CWA.

National Pretreatment Standard or Pretreatment Standard or Standard
[40 CFR §403.3(j)] Any regulation containing pollutant discharge limits promulgated by the EPA in accordance with section 307(b) and (c) of the Act, which applies to Industrial Users. This term includes prohibitive discharge limits established pursuant to §403.5.

New Source *[40 CFR §403.3(k)]*
Any building, structure, facility or installation from which there is or may be a discharge of pollutants, the construction of which commenced after the publication of proposed Pretreatment Standards under section 307(c) of the Act which will be applicable to such source if such standards are thereafter promulgated in accordance with that section *provided tha*t:
(a) The building, structure, facility or installation is constructed at a site at which no other discharge source is located; or
(b) The building, structure, facility or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
(c) The production or wastewater generating processes of the building, structure, facility, or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant, and the extent to which the new facility is engaged in the same general type of activity as the existing source, should be considered.
Construction on a site at which an existing source is located results in a modification rather than a new source if the construction does not create a new building, structure, facility, or installation meeting the criteria of paragraphs (k)(1)(ii), or (k)(1)(iii) of this section but otherwise alters, replaces, or adds to existing processor production equipment.
Construction of a new source, as defined under this paragraph has commenced if the owner or operator has:
(i) Begun, or caused to begin as part of a continuous onsite construction program:
(A) Any placement, assembly, or installation of facilities or equipment; or
(B) Significant site preparation work including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment, or
(C) Entered into a binding contractual obligation for the purchase of facilities or equipment which are intended to be used in its operation within a reasonable time. Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation under this paragraph.

90-Day Final Compliance Report *[40 CFR §403.12(d)]*
A report submitted by categorical industrial users within 90 days following the date for final compliance with the standards. This report must contain flow measurement (of regulated process streams and other streams), measurement of pollutants, and a certification as to whether the categorical standards are being met.

Nonconventional Pollutants
Any pollutant that is neither a toxic pollutant nor a conventional pollutant
(e.g., manganese, ammonia, etc.)

Non-Contact Cooling Water
Water used for cooling which does not come into direct contact with any raw material, intermediate product, waste product, or finished product. The only pollutant contributed from the discharge is heat.

Non-Regulated Wastestream
Unregulated and dilute wastestreams (not regulated by categorical standards).

Pass Through *[40 CFR §403.3(n)]*
A discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Periodic Compliance Report *[paraphrased from 40 CFR §403.12(e) & (h)]*
A report on compliance status submitted by categorical industrial users and significant noncategorical industrial users to the control authority at least semiannually (once every six months).

Point Source *[40 CFR 122.2]*
Any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fixture, container, rolling stock concentrated animal feeding operation vessel, or other floating craft from which pollutants are or may be discharged.

Pollutant *[40 CFR 122.2]*
Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal and agricultural waste discharged into water.

Pretreatment *[paraphrased from 40 CFR §403.3(q)]*
The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW.

Pretreatment Requirements *[40 CFR §403.3(r)]*
Any substantive or procedural requirement related to Pretreatment, other than a National Pretreatment Standard, imposed on an Industrial User.

Pretreatment Standards for Existing Sources (PSES)
Categorical Standards and requirements applicable to industrial sources that began construction prior to the publication of the proposed pretreatment standards for that industrial category.(see individual standards at 40 CFR Parts 405-471.)

Pretreatment Standards for New Sources (PSNS)
Categorical Standards and requirements applicable to industrial sources that began construction after the publication of the proposed pretreatment standards for that industrial category. (see individual standards at 40 CFR Parts 405-471.)

Priority Pollutant
Pollutant listed by the Administrator of the EPA under Clean Water Act section 307(a). The list of the current 126 Priority Pollutants can be found in 40 CFR Part 423 Appendix A.

Process Wastewater
Any water which, during manufacturing or processing, comes into contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Production-Based Standards
A discharge standard expressed in terms of pollutant mass allowed in a discharge per unit of product manufactured.

Publicly Owned Treatment Works (POTW) *[40 CFR §403.3(o)]*
A treatment works as defined by section 212 of the Act, which is owned by a State or municipality (as defined by section 502(4) of the Act). This definition includes any devices or systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes or other conveyances only if they convey wastewater to a POTW Treatment Plant.

The term also means the municipality as defined in section 502(4) of the Act, which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works.

Regulated Wastestream
For purposes of applying the combined wastestream formula, a wastestream from an industrial process that is regulated by a categorical standard.

Removal Credit *[paraphrased from 40 CFR §403.7]*
Variance from a pollutant limit specified in a categorical pretreatment standard to reflect removal by the POTW of said pollutant.

Representative Sample
A sample from a wastestream that is as nearly identical as possible in composition to that in the larger volume of wastewater being discharged and typical of the discharge from the facility on a normal operating day.

Sanitary Sewer Overflow (SSO)
Untreated or partially treated sewage overflows from a sanitary sewer collection system.

Self-Monitoring
Sampling and analyses performed by a facility to ensure compliance with a permit or other regulatory requirements.

Sewer Use Ordinance (SUO)
A legal mechanism implemented by a local government entity which sets out, among others, requirements for the discharge of pollutants into a publicly owned treatment works.

Significant Industrial User (SIU) *[paraphrased from 40 CFR §403.3(t)]*
(1) All users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR chapter I, subchapter N; and (2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)].

Significant Noncompliance (SNC) *[40 CFR §403.8(f)(2)(vii)]*
Industrial user violations meeting one or more of the following criteria:
1) Chronic violations of wastewater discharge limits, defined here as those in which sixty-six percent or more of all of the measurements taken during a six month period exceed (by any magnitude) the daily maximum limit or the average limit for the same pollutant parameter;
2) Technical Review Criteria (TRC) violations, defined here as those in which thirty-three percent or more of all of the measurements for each pollutants parameter taken during a six-month period equal or exceed the product of the daily maximum limit or the average limit multiplied by the applicable TRC (TRC=1.4 for BOD, TSS, fats, oil, and grease, and 1.2 for all other pollutants except pH);
3) Any other violation of a pretreatment effluent limit (daily maximum or longer-term average) that the Control Authority determines has caused, alone or in combination with other dischargers, interference or pass through (including endangering the health of POTW personnel or the general public);
4) Any discharge of a pollutant that has caused imminent endangerment to human health, welfare or to the environment or has resulted in the POTW's exercise of its emergency authority under paragraph (f)(1)(vi)(B) of this section to halt or prevent such a discharge;
5) Failure to meet, within 90 days after the schedule date, a compliance schedule milestone contained in a local control mechanism or enforcement order for starting construction, completing construction, or attaining final compliance;
6) Failure to provide, within 30 days after the due date, required reports such as baseline monitoring reports, 90-day compliance reports, periodic self-monitoring reports, and reports on compliance with compliance schedules;
7) Failure to accurately report noncompliance;
8) Any other violation or group of violations which the Control Authority determines will adversely affect the operation or implementation of the local pretreatment program.

Slug Discharge *[40 CFR §403.8(f)(2)(v)]*
Any discharge of a non-routine, episodic nature, including but not limited to, an accidental spill or a noncustomary batch discharge.

Specific Prohibitions *[40 CFR §403.5(b)]*
The following pollutants shall not be introduced into a POTW:
1) Pollutants which create a fire or explosion hazard in the POTW, including but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees
Centigrade using the test methods specified in 40 CFR Part 261.21;
2) Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, unless the works is specifically designed to accommodate such discharges;
3) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in interference;
4) Any pollutant, including oxygen-demanding pollutants (BOD, etc.) Released in a discharge at a flow rate and/or concentration which will cause interference with the POTW;
5) Heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40°C (104°F) unless the Approval Authority, upon request of the POTW, approves alternative temperature limits;
6) Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
7) Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;
8) Any trucked or hauled pollutants, except at discharge points designated by the POTW.

Standard Industrial Classification (SIC)
A system developed by the U.S. Office of Management and Budget that is used to classify various types of business entities. Effective in 1998, the SIC scheme is replace by the North American Industry Classification System (**NAICS**), although the EPA has not yet implemented this change.

Storm Water
Rain water, snowmelt, and surface runoff and drainage.

Time Proportional Composite Sample
A sample consisting of a series of aliquots collected from a representative point in the discharge stream at equal time intervals over the entire discharge period on the sampling day.

Toxic Pollutant
Any pollutant listed as toxic under section 307(a)(1) of the CWA, or in the case of sludge use or disposal practices, any pollutant identified in regulations implementing section 405(d) of the CWA.

Toxicity Reduction Evaluation
A site-specific study conducted in a stepwise process designed to identify the causative agent(s) of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

Toxicity Test
A procedure to determine the toxicity of a chemical or an effluent using living organisms. A toxicity test measures the degree of effect on exposed test organisms of a specific chemical or effluent.

Toxicity Identification Evaluation
Set of procedures to identify the specific chemicals responsible for effluent toxicity.

Unregulated Wastestream
For purposes of applying the combined wastestream formula, a wastestream not regulated by a categorical standard nor considered a dilute wastestream.

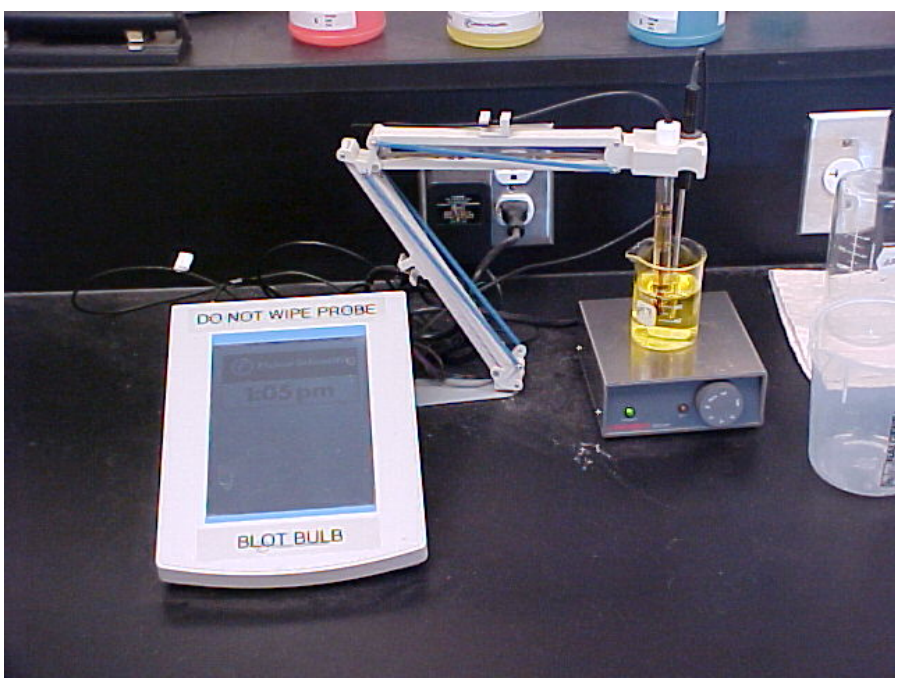
Upset *[paraphrased from 40 CFR §403.16(a)]*
An exceptional incident in which there is unintentional and temporary noncompliance with categorical Pretreatment Standards because of factors beyond the reasonable control of the Industrial User. An Upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality Criteria
Comprised of both numeric and narrative criteria. Numeric criteria are scientifically derived ambient concentrations developed by EPA or States for various pollutants of concern to protect human health and aquatic life. Narrative criteria are statements that describe the desired water quality goal.

Water Quality Standard
A statute or regulation that consists of the beneficial designated use or uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular waterbody, and an antidegradation statement.

Whole Effluent Toxicity
The total toxic effect of an effluent measured directly with a toxicity test.

Normal pretreatment equipment found in a regulated industry. pH, ORP and Temperature measuring equipment. Notice the different pH buffers in the upper right of the top photo, and center of the bottom photo. Yellow, red and blue are the normal pH buffers. You are required to calibrate your pH probe at least daily and record your values in a log book. Many States will require a written pH procedure and may require both your log book and procedure in court.



Clean Water Act Summary

33 U.S.C. s/s 1251 et seq. (1977)

The Clean Water Act is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States.

The law gave the EPA the authority to set effluent standards on an industry basis (technology-based) and continued the requirements to set water quality standards for all contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit (**NPDES**) is obtained under the Act.

The 1977 amendments focused on toxic pollutants. In 1987, the PCA was reauthorized and again focused on toxic substances, authorized citizen suit provisions, and funded sewage treatment plants (**POTW's**) under the Construction Grants Program.

The CWA made provisions for the delegation by the EPA of many permitting, administrative, and enforcement aspects of the law to state governments. In states with the authority to implement CWA programs, the EPA still retains oversight responsibilities.

In 1972, Congress enacted the first comprehensive national clean water legislation in response to growing public concern for serious and widespread water pollution. The Clean Water Act is the primary federal law that protects our nation’s waters, including lakes, rivers, aquifers and coastal areas.

Lake Erie was dying. The Potomac River was clogged with blue-green algae blooms that were a nuisance and a threat to public health. Many of the nation's rivers were little more than open sewers and sewage frequently washed up on shore. Fish kills were a common sight. Wetlands were disappearing at a rapid rate.

Today, the quality of our waters has improved dramatically as a result of a cooperative effort by federal, state, tribal and local governments to implement the pollution control programs established in 1972 by the Clean Water Act.

The Clean Water Act's primary objective is to restore and maintain the integrity of the nation's waters. This objective translates into two fundamental national goals:

- eliminate the discharge of pollutants into the nation's waters, and
- achieve water quality levels that are fishable and swimmable.

The Clean Water Act focuses on improving the quality of the nation’s waters. It provides a comprehensive framework of standards, technical tools and financial assistance to address the many causes of pollution and poor water quality, including municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction.

For example, the Clean Water Act requires major industries to meet performance standards to ensure pollution control; charges states and tribes with setting specific water quality criteria appropriate for their waters and developing pollution control programs to meet them; provides funding to states and communities to help them meet their clean water infrastructure needs; protects valuable wetlands and other aquatic habitats through a permitting process that ensures development and other activities are conducted in an environmentally sound manner.

After 25 years, the Act continues to provide a clear path for clean water and a solid foundation for an effective national water program.

In 1972:
Only a third of the nation's waters were safe for fishing and swimming. Wetlands losses were estimated at about 460,000 acres annually.

Agricultural runoff resulted in the erosion of 2.25 billion tons of soil and the deposit of large amounts of phosphorus and nitrogen into many waters. Sewage treatment plants served only 85 million people.

Today:
Two-thirds of the nation's waters are safe for fishing and swimming.

The rate of annual wetlands losses is estimated at about 70,000-90,000 acres according to recent studies. The amount of soil lost due to agricultural runoff has been cut by one billion tons annually, and phosphorus and nitrogen levels in water sources are down. Modern wastewater treatment facilities serve 173 million people.

The Future:
All Americans will enjoy clean water that is safe for fishing and swimming. We will achieve a net gain of wetlands by preventing additional losses and restoring hundreds of thousands of acres of wetlands. Soil erosion and runoff of phosphorus and nitrogen into watersheds will be minimized, helping to sustain the nation's farming economy and aquatic systems. The nation's waters will be free of effects of sewage discharges.

Chapter 1 What is a Pretreatment Program?

The term "**pretreatment**" refers to the requirement that non-domestic sources discharging wastewater to POTWs control their discharges, and meet limits established by the EPA, and/or your state or the local municipality (**Control Authority**) on the amount of pollutants allowed to be discharged. The control of the pollutants may necessitate treatment prior to discharge to the POTW (therefore the term "**pretreatment**").

Limits may often be met by the non-domestic source through pollution prevention techniques (product substitution, recycle and reuse of materials, more efficient production practices, improved environmental management systems, etc.), pretreatment of wastewater, or implementation of best management practices.

The National Pretreatment Program is a cooperative effort of federal, state, and local regulatory environmental agencies established to protect water quality. The program is designed to reduce the level of pollutants discharged by industry and other non-domestic wastewater sources into municipal sewer systems, and thereby, reduce the amount of pollutants released into the environment from these sources.

The national pretreatment program was established by Congress under authority of the Federal Water Pollution Control Act of 1972 (Pub. L. 92-500) as amended by the Clean Water Act of 1977 (Pub. L. 95-217). Implementation requirements of the pretreatment portions of these laws were first codified into 40 Code of Federal Regulations (**CFR**) Part 403 in 1978.

Objectives of the pretreatment program:

1. Protect publicly owned treatment works (**POTW**) from pollutants that may cause interference with sewage treatment plant operations.
2. Prevent introducing pollutants into a POTW that could cause pass through of untreated pollutants to receiving waters.
3. Manage pollutant discharges into a POTW to improve opportunities for reuse of POTW wastewater and residuals (sewage sludge).
4. Prevent introducing pollutants into a POTW that could cause worker health or safety concerns, or that could pose a potential endangerment to the public or to the environment.

POTWs

Publicly owned treatment works (**POTWs**) collect wastewater from homes, commercial buildings, and industrial facilities and transport it via a series of pipes, known as a collection system, to the treatment plant. Here, the POTW removes harmful organisms and other contaminants from the sewage so it can be discharged safely into the receiving stream. Generally, POTWs are designed to treat domestic sewage only.

However, POTWs also receive wastewater from industrial (non-domestic) users. The General Pretreatment Regulations establish responsibilities of Federal, State, and local government, industry and the public to implement Pretreatment Standards to control pollutants from the industrial users which may pass through or interfere with POTW treatment processes or which may contaminate sewage sludge.

National Pretreatment Program

The National Pretreatment Program identifies specific requirements that apply to all IUs, additional requirements that apply to all SIUs, and certain requirements that only apply to CIUs.

The objectives of the National Pretreatment Program are achieved by applying and enforcing three types of discharge standards:

- **prohibited discharge standards**
- **categorical Pretreatment standards**
- **local limits**

Prohibited Discharge Standards

Prohibited discharge standards are somewhat general, national standards are applicable to all industrial users to a POTW, regardless of whether or not the POTW has an approved pretreatment program or the industrial user has been issued a permit.

These standards are designed to protect against pass through and interference, protect the POTW collection system, and to promote worker safety and beneficial biosolids use. These standards are listed in 40 CFR 403.5

For Final Regulations pertaining to the Pretreatment Program, refer to 40 CFR Part 403 general pretreatment regulations (Located in the rear of this course).

Categorical Pretreatment Standards

Categorical Pretreatment Standards are limitations on pollutant discharges to publicly owned treatment works (POTWs), promulgated by the EPA in accordance with Section 307 of the Clean Water Act that apply to specific process wastewaters of particular industrial categories.

These are national, technology-based standards that apply regardless of whether or not the POTW has an approved pretreatment program or the industrial user has been issued a permit. Such industries are called Categorical Industrial Users. The standards applicable to industrial discharges to a POTW collection system are designated in the Effluent Guidelines & Limitations [Parts 405-471] by the terms "**Pretreatment Standards for Existing Sources**" (or "**PSES**") and "**Pretreatment Standards for New Sources**" (or "**PSNS**").

Note: The Effluent Guidelines & Limitations designated by the terms **"Best Practicable Control Technology Currently Available (BPT)"**, "**Best Available Technology Economically Achievable (BAT)", "Best Conventional Pollutant Control Technology (BCT)", and "New Source Performance Standards (NSPS)"** apply to industries that discharge process wastewater to waters of the U.S. and should have a National Pollutant Discharge Elimination System (**NPDES**) Permit.

Local Limits

Local limits are developed to reflect specific needs and capabilities at individual POTWs and designed to protect the POTW receiving waters. Regulations at 40 CFR 403.8(f)(4) state that POTW Pretreatment Programs must develop local limits or demonstrate that they are unnecessary; 40 CFR 403.5(c) states that local limits are needed when pollutants are received that could result in pass through or interference at the POTW. Essentially, local limits translate the general prohibited discharge standards of 40 CFR 403.5 to site-specific needs.

Assistance on how to develop local limits may be found in the Guidance Manual for the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program, December 1987 (EPA#833-B-87-202, ERIC#W107, NTIS#PB92-129188). Information related to ordering this publication from the Office of Wastewater Management is located at: http://www.epa.gov/owm/inpub.htm.

The EPA Supplemental Manual on the Development And Implementation of Local Discharge Limitations Under the Pretreatment Program: Residential and Commercial Toxic Pollutant Loadings and POTW Removal published May 1, 1991 provides information related to residential and commercial sources of toxic pollutants and estimated removal efficiencies of municipal treatment processes.

Two automatic wastewater samplers, one for Local Limits or compliance and the other for the wastewater plant operator to determine plant efficiency.

An automatic sampler.

Water Quality Standard
A statute or regulation that consists of the beneficial designated use or uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular waterbody, and an antidegradation statement.

The Need for the Pretreatment Program

The average American uses roughly 100 to 200 gallons of water a day, with less than one percent of that water actually being consumed. The rest is used for activities such as washing, preparing food, watering lawns, heating and cooling, transporting wastes, and fire protection. The public is very conscious about the quality of water that comes out of their tap each day, quickly notifying authorities of changes in appearance, odor, and taste.

These same Americans, on average, discharge about the same amount of wastewater to local sewage treatment plants daily. This wastewater (commonly referred to as "**domestic sewage**") receives much less attention than drinking water, likely the result of an "out of sight, out of mind" attitude.

Most people take it for granted that once down the drain, wastes will be handled appropriately. In fact, this attitude has carried over to industry as well, as can be seen by reading the labels of many household products.

These labels often recommend that waste or excess product be disposed of down the drain. Other toxic or hazardous products are actually designed to be disposed of down the drain (e.g., drain clog remover).

Recall the phosphate detergent problems of the late 1960s and early 70s; large doses of phosphate, found in most detergents at the time, were passing through municipal treatment plants and overloading lakes, causing large algal blooms to form and subsequently reducing available light, food and oxygen for fish and other aquatic organisms. While great strides have been taken to address the phosphate problem, it is possible that other problematic pollutants are being dumped down the drain at the expense of human health and the environment.

FACTOR	TYPE	SOURCE(S)	PROBLEM
FECAL COLIFORM BACTERIA	BIOLOGICAL	HUMAN SEWAGE; LIVESTOCK WASTE	POSSIBLE PRESENCE OF PATHOGENIC (DISEASE-CAUSING) ORGANISMS
DISSOLVED OXYGEN (DO)	CHEMICAL	AIR; AQUATIC PLANTS	LOW LEVELS CAN KILL AQUATIC ORGANISMS
NITROGEN AND PHOSPHORUS	CHEMICAL	FERTILIZERS AND DETERGENTS FROM LAWNS AND RUNOFF	EXCESSIVE ALGAE GROWTH CAN LEAD TO LOW DO
ZINC, ARSENIC, LEAD, MERCURY, CADMIUM, NICKEL	CHEMICAL	LANDFILLS; INDUSTRIAL DISCHARGES; RUNOFF	GENETIC MUTATIONS OR DEATH IN FISH & WILDLIFE (HUMAN HEALTH THREATS AS WELL)
SALT	CHEMICAL	SALTWATER INTRUSION (IF NEAR OCEAN)	KILLS FRESHWATER SPECIES OF PLANTS AND ANIMALS
MUD, SAND, OTHER SOLID PARTICLES (TURBIDITY)	PHYSICAL	EROSION AND RUNOFF FROM DEVELOPMENT; AGRICULTURE	REDUCES PHOTOSYNTHESIS IN AQUATIC VEGETATION; INTERFERES WITH RESPIRATION IN AQUATIC ANIMALS

WATER QUALITY FACTORS

Sewage Collection System

Publicly owned treatment works (**POTWs**) collect wastewater from homes, commercial buildings, and industrial facilities and transport it via a series of pipes, known as a collection system, to the treatment plant.

Collection systems may flow entirely by gravity, or may include lift stations that pump the wastewater via a force main to a higher elevation where the wastewater can then continue on via gravity. Ultimately, the collection system delivers this sewage to the treatment plant facility. Here, the POTW removes harmful organisms and other contaminants from the sewage so it can be discharged safely into the receiving stream.


New sewer manhole with sewer mains before final burial.

Without treatment, sewage creates bad odors, contaminates water supplies, and spreads disease. Today, more than 16,000 sewage treatment plants exist in the U.S. treating more than 32 billion gallons per day of wastewater.

Modern sewer vactor

POTWS

Generally, POTWs are designed to treat domestic sewage only. Simply defined, the typical POTW treatment process consists of primary and secondary treatment, along with some form of solids handling. Primary treatment is designed to remove large solids (e.g., rags and debris) and smaller inorganic grit. Typical primary treatment operations include screening and settling. Secondary treatment removes organic contaminants using microorganisms to consume biodegradable organics.

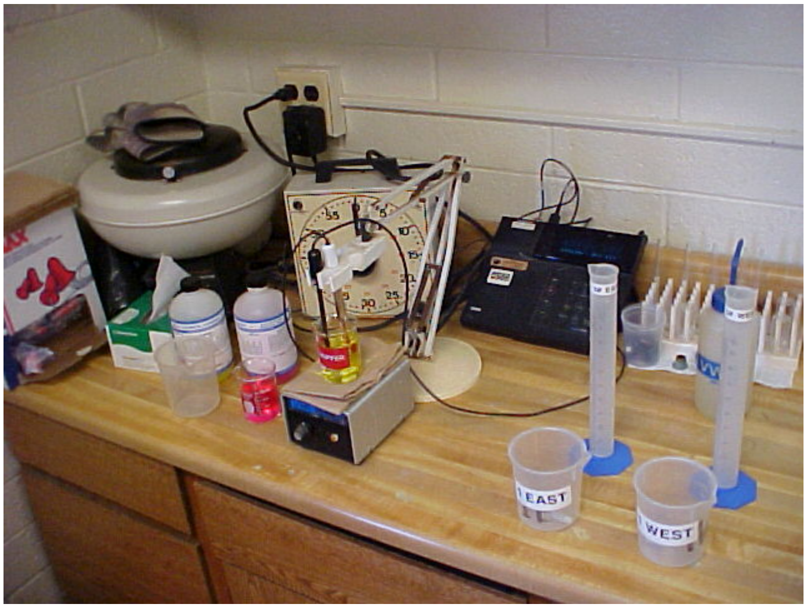
Odor control facility at a modern wastewater treatment plant--the picture on the right is of an enclosed *"headworks"* to help lower odor complaints.

Activated sludge, trickling filters, and rotating biological contactors are examples of common secondary treatment operations. Depending on effluent discharge requirements, POTWs may perform other "**advanced treatment**" operations such as nitrification (to convert ammonia and nitrite to the less toxic nitrate), denitrification (to convert nitrate to molecular nitrogen).

Aerated Wastewater

Conventional Pollutants *Figure 1*

- Biochemical Oxygen Demand (BOD)
- Total Suspended Solids (TSS)
- Fecal Coliform
- pH
- Oil and Grease (O&G)



A Small Wastewater Treatment Operators Lab

Physical-Chemical Treatment

Physical-chemical treatment (to remove dissolved metals and organics), and disinfection (to kill any remaining pathogens). After treatment is complete, effluent is discharged to the receiving stream, typically a creek, river, lake, estuary or ocean. Some POTWs may apply treated effluent directly to golf courses, parkland, or croplands.

Both primary and secondary treatment processes generate waste solids, known as sewage sludge or biosolids. Sludges from the treatment process may be used productively (i.e., as fertilizer or soil conditioner), disposed of in a landfill or incinerated in a dedicated sewage sludge incinerator with the ash also disposed of in a landfill.

As described above, POTWs are designed to treat typical household wastes and biodegradable commercial and biodegradable industrial wastes. The Clean Water Act (**CWA**) and the EPA define the contaminants from these sources as conventional pollutants. Conventional pollutants are identified in Figure 1 above and include those specific pollutants that are expected to be present in domestic discharges to POTWs.

Commercial and industrial facilities may, however, discharge toxic pollutants that the treatment plant is neither designed for nor able to remove.

Discharge to POTW

As noted above, POTWs are not designed to treat toxics in industrial waste. As such, these discharges, from both industrial and commercial sources, can cause serious problems. The undesirable outcome of these discharges can be prevented using treatment techniques or management practices to reduce or eliminate the discharge of these contaminants. The act of treating wastewater prior to discharge to a POTW is commonly referred to as "**pretreatment**." The National Pretreatment Program, published in **Title 40 Code of Federal Regulations (CFR) Part 403**, provides the regulatory basis to require non-domestic dischargers to comply with pretreatment standards (effluent limitations) to ensure that the goals of the CWA are attained.

As noted in 40CFR §403.2, the objectives of the National Pretreatment Program are to:
a. Prevent the introduction of pollutants into POTWs which will interfere with the operation of a POTW, including interference with its use or disposal of municipal sludge;
b. Prevent the introduction of pollutants into POTWs which will pass through the treatment works or otherwise be incompatible with such works; and
c. Improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges.

The two key terms used in the EPA's objectives for the National Pretreatment Program, "***interference***" and "***pass through***," are defined below.

Definitions

Interference - a discharge which, alone or in conjunction with a discharge or discharges from other sources, both inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal, and- therefore is a cause of a violation of any NPDES permit requirement or of the prevention of sewage sludge use or disposal in compliance with any applicable requirements.

Pass Through - a discharge which exits the POTW into waters of the U.S. in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any NPDES permit requirement.

As outlined in the EPA's objectives, toxic pollutants may pass through the treatment plant into the receiving stream, posing serious threats to aquatic life, to human recreation, and to consumption of fish and shellfish from these waters. Pass through can make waters unswimmable or unfishable in direct contrast to the goals of the CWA. Or, these discharges can interfere with the biological activity of the treatment plant causing sewage to pass through the treatment plant untreated or inadequately treated.

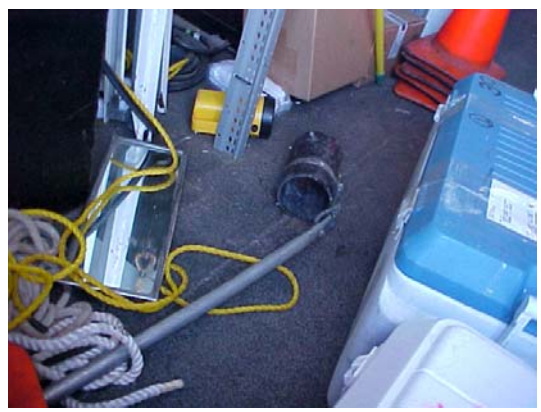
Problems Associated With Toxic Discharges *Figure 3*

Air pollution can occur from volatilization of toxic chemicals in the POTW collection system or treatment plant, or through incineration of sewage sludge.
Corrosion of collection system and treatment plant from acidic discharges or discharges containing elevated levels of sulfate (forming toxic and corrosive hydrogen sulfide).
Groundwater pollution can occur from leaks in the collection system or pollutants from contaminated sewage sludge.

Toxic Emissions

Even where the POTW has the capability to remove these toxics, the pollutants may end up in the sewage sludge, thereby limiting sludge disposal options or escalating the cost of disposal. Incinerated contaminated sludge may release toxic emissions into the atmosphere. Toxic metals removed in primary treatment, while itself not an inhibitory process, can impact sludge digestion, a process that utilizes bacteria to stabilize sludge solids.

For example, chromium can inhibit reproduction of aerobic digestion microorganisms, thereby disrupting sludge treatment and producing sludges that must be disposed of with special treatment. Uncontaminated sludge, on the other hand, can be used as fertilizer or soil conditioner, thereby improving the productivity of our land. Many municipalities apply sewage sludge to pastureland or parkland that they could not do if the sludge were contaminated.



Tools of the Trade… Above photos, the Refrigerated Automatic Sampler will have a Data programmer which will allow you to set the time to collect the sample or samples. This machine can also measure the amount of the sample.

These can also be used for the collection of composite samples. Sometimes you will see a pH probe with real-time reads sent to the Operator’s Command Center. A common site on most wastewater plants and SIUs.

VOCs

Volatile organics discharged to sewers can accumulate in the headspace of sewers, increasing the likelihood of explosions that can cause significant damage. Probably the most well known impact from industrial discharges to POTWs in the U.S. is the explosion in Louisville, KY that occurred in 1981 as the result of excessive discharges of hexane into the collection system, eventually igniting and destroying more than 3 miles of sewers and causing $20 million in damage. Discharge limitations and management practices to control slug discharges have significantly reduced the likelihood of future catastrophes such as the explosion in Louisville.

Discharges of toxic organics can also result in the release of poisonous gas. This occurs most often when acidic wastes react with other wastes in the discharge. For example, cyanide and acid, both present in many electroplating operations, react to form highly toxic hydrogen cyanide gas. Similarly, sulfides from leather tanning can combine with acid to form hydrogen sulfide, another toxic gas. These can be highly dangerous to POTW collection system operators exposed to such conditions in the performance of their duties.

Other problems associated with toxic discharges were summarized in Figure 3 and further document the urgency of keeping toxics out of collection systems and POTWs.

The National Pretreatment Program is charged with controlling the 126 Priority Pollutants from industries that discharge into sewer systems as described in the CWA (see Figure 4).

These pollutants fall into two categories; metals and organics:

- Metals, including lead, mercury, chromium, and cadmium, that cannot be destroyed or broken down through treatment or environmental degradation. Toxic metals can cause different human health problems such as lead poisoning and cancer. Additionally, consumption of contaminated seafood and agricultural food crops has resulted in exposures exceeding recommended safe levels.
- Toxic organics, including solvents, pesticides, dioxins, and polychlorinated biphenyls (**PCBs**) can be cancer-causing and lead to other serious ailments, such as kidney and liver damage, anemia, and heart failure. In 1996, the EPA's Office of Science and Technology (**OST**) identified 2,193 water bodies with fish and wildlife advisories, up more than 25 percent from 1995.

Reductions in pollutants can ensure that industrial development vital to the economic well being of a community is compatible with a healthy environment.

Many POTWs are responsible for ensuring that industrial and commercial facilities do not cause problems resulting from their discharges. In 1991, the EPA estimated that 190 to 204 million pounds of metals and 30 to 108 million pounds of organics were removed each year as a result of pretreatment program requirements.

This is substantiated by many POTWs that report significant reductions in the loadings of toxics to their treatment plants that is directly attributable to implementation of the National Pretreatment Program.

Priority Pollutants ***Figure 4***

001 Acenaphthene
002 Acrolein
003 Acrylonitrile
004 Benzene
005 Benzidine
006 Carbon tetrachloride
007 Chlorobenzene
008 1,2,4-trichlorobenzene
009 Hexachlorobenzene
010 1,2-dichloroethane
011 1,1,1-trichloreothane
012 Hexachloroethane
013 1,1-dichloroethane
014 1,1,2-trichloroethane
015 1,1,2,2-tetrachloroethane
016 Chloroethane
018 Bis(2-chloroethyl) ether
019 2-chloroethyl vinyl ethers
020 2-chloronaphthalene
021 2,4,6-trichlorophenol
022 Parachlorometa cresol
023 Chloroform
024 2-chlorophenol
025 1,2-dichlorobenzene
026 1,3-dichlorobenzene
027 1,4-dichlorobenzene
028 3,3-dichlorobenzidine
029 1,1-dichloroethylene
030 1,2-trans-dichloroethylene
031 2,4-dichlorophenol
032 1,2-dichloropropane
033 1,2-dichloropropylene
034 2,4-dimethylphenol
035 2,4-dinitrotoluene
036 2,6-dinitrotoluene
037 1,2-diphenylhydrazine
038 Ethylbenzene
039 Fluoranthene
040 4-chlorophenyl phenyl ether
041 4-bromophenyl phenyl ether
042 Bis(2-chloroisopropyl) ether
043 Bis(2-chloroethoxy) methane
044 Methylene chloride
045 Methyl chloride
046 Methyl bromide
047 Bromoform
048 Dichlorobromomethane
051 Chlorodibromomethane
052 Hexachlorobutadiene
053 Hexachlorocyclopentadiene
054 Isophorone
055 Naphthalene
056 Nitrobenzene
057 2-nitrophenol
058 4-nitrophenol
059 2,4-dinitrophenol
060 4,6-dinitro-o-cresol
061 N-nitrosodimethylamine
062 N-nitrosodiphenylamine
063 N-nitrosodi-n-propylamine
064 Pentachlorophenol
065 Phenol
066 Bis(2-ethylhexyl) phthalate
067 Butyl benzyl phthalate
068 Di-N-Butyl Phthalate
069 Di-n-octyl phthalate
070 Diethyl Phthalate
071 Dimethyl phthalate
072 benzo(a) anthracene
073 Benzo(a)pyrene
074 Benzo(b) fluoranthene
075 Benzo(b) fluoranthene
076 Chrysene
077 Acenaphthylene
078 Anthracene
079 Benzo(ghi) perylene
080 Fluorene
081 Phenanthrene
082 Dibenzo(,h) anthracene
083 Indeno (1,2,3-cd) pyrene
084 Pyrene
085 Tetrachloroethylene
086 Toluene
087 Trichloroethylene
088 Vinyl chloride
089 Aldrin
090 Dieldrin
091 Chlordane
092 4,4-DDT
093 4,4-DDE
094 4,4-DDD
095 Alpha-endosulfan
096 Beta-endosulfan
097 Endosulfan sulfate
098 Endrin
099 Endrin aldehyde
100 Heptachlor
101 Heptachlor epoxide
102 Alpha-BHC
103 Beta-BHC
104 Gamma-BHC
105 Delta-BHC
106 PCB–1242
107 PCB–1254
108 PCB–1221
109 PCB–1232
110 PCB–1248
111 PCB–1260
112 PCB–1016
113 Toxaphene
114 Antimony
115 Arsenic
116 Asbestos
117 Beryllium
118 Cadmium
119 Chromium
120 Copper
121 Cyanide, Total
122 Lead
123 Mercury
124 Nickel
125 Selenium
126 Silver
127 Thallium
128 Zinc
129 2,3,7,8-TCDD

Section 101 of the Clean Water Act (CWA)

To restore and maintain the chemical, physical, and biological integrity of the Nation's waters:
(1) it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;
(2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;
(3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited;
(4) it is the national policy that Federal financial assistance be provided to construct publicly owned waste treatment works;
(5) it is the national policy that Area wide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State;
(6) it is the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into the navigable waters, waters of the contiguous zone, and the oceans; and
(7) it is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Chapter to be met through the control of both point and nonpoint sources of pollution.

Treated wastewater outfall.

Covered wastewater basins to prevent or control odors.

Publicly Owned Treatment Works (POTW) *[40 CFR §403.3(o)]*
A treatment works as defined by section 212 of the Act, which is owned by a State or municipality (as defined by section 502(4) of the Act). This definition includes any devices or systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes or other conveyances only if they convey wastewater to a POTW Treatment Plant.

Chapter 2
Overview of the National Pretreatment Program
The Clean Water Act

On October 18, 1972, the 92nd Congress of the United States passed the Federal Water Pollution Control Act Amendments of 1972, declaring the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's water as a National Objective. While procedures for implementing this act (more commonly referred to as the Clean Water Act (**CWA**)) have been re-evaluated and modified over time, the 1972 objective has remained unchanged in its 48-year history.

The 1972 Amendments to the CWA established a water quality regulatory approach along with the EPA-promulgated industry-specific technology-based effluent limitations. The National Pollutant Discharge Elimination System (**NPDES**) permit program was established under the CWA to control the discharge of pollutants from point sources and served as a vehicle to implement the industrial technology-based standards. To implement pretreatment requirements, the EPA promulgated 40 CFR Part 128 in late 1973, establishing general prohibitions against treatment plant interference and pass through and pretreatment standards for the discharge of incompatible pollutants from specific industrial categories.

In 1975, several environmental groups filed suit against the EPA, challenging it's criteria for identifying toxic pollutants, the EPA's failure to promulgate effluent standards, and the EPA's failure to promulgate pretreatment standards for numerous industrial categories.

As a result of this litigation, the EPA promulgated the General Pretreatment Regulations at 40 CFR Part 403 on June 26, 1978, replacing the 40 CFR Part 128 requirements. Additionally, as a result of the suit, the EPA agreed to regulate the discharge of 65 categories of pollutants (making up the 126 priority pollutants presented in Figure 4) from 21 industrial categories. The list of priority pollutants is still in effect today (the original list actually had 129 pollutants, three of which have since been removed from that list) while the list of regulated industrial categories has grown to more than 51 distinct industries.

Modern Wastewater Treatment Plant

The National Pretreatment Program is unique in that the General Pretreatment Regulations require all large POTWs (i.e., those designed to treat flows of more than 5 million gallons per day) and smaller POTWs with significant industrial discharges to establish local pretreatment programs. These local programs must enforce all national pretreatment standards and requirements in addition to any more stringent local requirements necessary to protect site-specific conditions at the POTW.

General Pretreatment Regulations at 40 CFR Part 403§ 403.1 Purpose and Applicability

Figure 6. The General Pretreatment Regulations

§ 403.2 Objectives of general pretreatment regulations
§ 403.3 Definitions
§ 403.4 State or local law
§ 403.5 National pretreatment standards: Prohibited discharges
§ 403.6 National pretreatment standards: Categorical pretreatment standards
§ 403.7 Removal credits
§ 403.8 Pretreatment program requirements: Development and implementation by POTW
§ 403.9 POTW pretreatment programs and/or authorization to revise pretreatment standards: Submission for approval
§ 403.10 Development and submission of NPDES State pretreatment programs
§ 403.11 Approval procedures for POTW pretreatment programs and POTW granting of removal credits
§ 403.12 Reporting requirements for POTW's and industrial users
§ 403.13 Variances from categorical pretreatment standards for fundamentally different factors
§ 403.14 Confidentiality
§ 403.15 Net/Gross calculation
§ 403.16 Upset provision
§ 403.17 Bypass
§ 403.18 Modification of POTW pretreatment programs
Appendix A: Program Guidance Memorandum
Appendix B: [Reserved]
Appendix C: [Reserved]
Appendix D: Selected Industrial Subcategories Considered Dilute for Purposes of the Combined Wastestream Formula
Appendix E: Sampling Procedures
Appendix F: [Reserved]
Appendix G: Pollutants Eligible for a Removal Credit

The General Pretreatment Regulations

1. The General Pretreatment Regulations establish responsibilities of Federal, State, and local government, industry and the public to implement Pretreatment Standards to control pollutants which pass through or interfere with POTW treatment processes or which may contaminate sewage sludge. The regulations, which have been revised numerous times since originally published in 1978, consist of 18 sections and several appendices.

2. The General Pretreatment Regulations apply to all non-domestic sources which introduce pollutants into a POTW. These sources of "***indirect discharge***" are more commonly referred to as industrial users (**IUs**).

3. Since IUs can be as simple as an unmanned coin operated car wash to as complex as an automobile manufacturing plant or a synthetic organic chemical producer, EPA developed four criteria that define a Significant Industrial User (**SIU**). Many of the General Pretreatment Regulations apply to SIUs as opposed to IUs, based on the fact that control of SIUs should provide adequate protection of the POTW.

These four criteria are as follows:

- ✓ An IU that discharges an average of 25,000 gallons per day or more of process wastewater to the POTW;
- ✓ An IU that contributes a process wastestream making up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant;
- ✓ An IU designated by the Control Authority as such because of its reasonable potential to adversely affect the POTW's operation or violate any pretreatment standard or requirement; or
- ✓ An IU subject to Federal categorical pretreatment standards.

Unlike other environmental programs that rely on Federal or State governments to implement and enforce specific requirements, the Pretreatment Program places the majority of the responsibility on local municipalities. Specifically, section 403.8(a) of the General Pretreatment Regulations states that any POTW (or combination of treatment plants operated by the same authority) with a total design flow greater than 5 million gallons per day (**MGD**) and smaller POTWs with SIUs must establish a local pretreatment program.

As of early 1998, 1,578 POTWs are required to have local programs. While this represents only about 15 percent of the total treatment plants nationwide, these POTWs account for more than 80 percent (i.e., approximately 30 billion gallons a day) of the national wastewater flow.

Control Authority

The General Pretreatment Regulations define the term "**Control Authority**" as a POTW that administers an approved pretreatment program since it is the entity authorized to control discharges to its system.

Section 403.10(e) provides States authority to implement POTW pretreatment programs in lieu of POTWs. Five States have elected to assume this responsibility (Vermont, Connecticut, Alabama, Mississippi, and Nebraska). In these instances, the State is defined as the Control Authority. As described above, all Control Authorities must establish a local pretreatment program to control discharges from non-domestic sources.

Approval Authority

These programs must be approved by the "**Approval Authority**" who is also responsible for overseeing implementation and enforcement of these programs.

As of 6/2020, a total of 47 States /Territories are authorized to implement State NPDES Permit Programs, but only 37 are authorized to be the Pretreatment Program Approval Authority. In all other States and Territories (including the 403.10(e) States), the EPA is considered to be the Approval Authority. In all other States and Territories (including the 403.10(e) States), the EPA is considered to be the Approval Authority.

POTW Pretreatment Programs

The actual requirement for a POTW to develop and implement a local pretreatment program is a condition of its NPDES permit. Once the Approval Authority determines that a POTW needs a pretreatment program, the POTW's NPDES permit is modified to require development of a local program and submission of the program to the Approval Authority for review and approval. Consistent with §403.8(f), POTW pretreatment programs must contain the six minimum elements.

In addition to the six specific elements, pretreatment program submissions must include:

- a statement from the City Solicitor (or the like) declaring the POTW has adequate authority to carry out program requirements;
- copies of statutes, ordinances, regulations, agreements, or other authorities the POTW relies upon to administer the pretreatment program including a statement reflecting the endorsement or approval of the bodies responsible for supervising and/or funding the program;
- a brief description and organizational chart of the organization administering the program; and
- a description of funding levels and manpower available to implement the program.

Pretreatment program submissions found to be complete proceed to the public notice process, Public Participation and POTW Reporting. Upon program approval, the Approval Authority is responsible for modifying the POTW's NPDES permit to require implementation of the approved pretreatment program. Once approved, the Approval Authority oversees POTW pretreatment program implementation via receiving annual reports and conducting periodic audits and inspections.

As of early 1998, of the 1,578 POTWs required to develop pretreatment programs, 97 percent (1,535) have been approved. The National Pretreatment Program regulates IUs through three types of regulatory entities: the EPA, Approval Authorities, and Control Authorities. As noted above, Approval Authorities oversee Control Authorities while Control Authorities regulate IUs.

Using a pole with a sample attachment to grab a sample.

Approved State NPDES Permit Program		Approved State Pretreatment Program
Alabama	10/19/79	10/19/79*
Arizona		
Arkansas	11/01/86	11/01/86
California	05/14/73	09/22/89
Colorado	03/27/75	--
Connecticut	09/26/73	06/03/81*
Delaware	04/01/74	--
Florida	05/01/95	05/01/95
Georgia	06/28/74	03/12/81
Hawaii	11/28/74	08/12/83
Illinois	10/23/77	--
Indiana	01/01/75	--
Iowa	08/10/78	06/03/81
Kansas	06/28/74	--
Kentucky	09/30/83	09/30/83
Louisiana	08/27/96	08/27/96
Maryland	09/05/74	09/30/85
Michigan	10/17/73	04/16/85
Minnesota	06/30/74	07/16/79
Mississippi	05/01/74	05/13/82*
Missouri	10/30/74	06/03/81
Montana	06/10/74	--
Nebraska	06/12/74	09/07/84*
Nevada	09/19/75	--
New Jersey	04/13/82	04/13/82
New York	10/28/75	--
North Carolina	10/19/75	06/14/82
North Dakota	06/13/75	--
Ohio	03/11/74	07/27/83
Oklahoma	11/19/96	11/19/96
Oregon	09/26/73	03/12/81
Pennsylvania	06/30/78	--
Rhode Island	09/17/84	09/17/84
South Carolina	06/10/75	04/09/82
South Dakota	12/30/93	12/30/93
Tennessee	12/28/77	08/10/83
Texas	09/14/98	09/14/98
Utah	07/07/87	07/07/87
Vermont	03/11/74	03/16/82*
Virgin Islands	06/30/76	--
Virginia	03/31/75	04/14/89
Washington	11/14/73	09/30/86
West Virginia	05/10/82	05/10/82
Wisconsin	02/04/74	12/24/80
Wyoming	01/30/75	--

* - Denotes 403.10(e) State Approval

Six Minimum Pretreatment Program Elements

1. Legal Authority (*see ordinance example in the rear*)
The POTW must operate pursuant to legal authority enforceable in Federal, State or local courts, which authorizes or enables the POTW to apply and enforce any pretreatment regulations developed pursuant to the CWA. At a minimum, the legal authority must enable the POTW to:
I. deny or condition discharges to the POTW;
ii. require compliance with pretreatment standards and requirements;
iii. control IU discharges through permits, orders, or similar means;
iv. require IU compliance schedules when necessary to meet applicable pretreatment standards and/or requirements and the submission of reports to demonstrate compliance;
v. inspect and monitor IUs;
vi. obtain remedies for IU noncompliance; and
vii. comply with confidentiality requirements.

2. Procedures
The POTW must develop and implement procedures to ensure compliance with pretreatment requirements, including:
I. identify and locate all IUs subject to the pretreatment program;
ii. identify the character and volume of pollutants contributed by such users;
iii. notify users of applicable pretreatment standards and requirements;
iv. receive and analyze reports from IUs;
v. sample and analyze IU discharges and evaluate the need for IU slug control plans;
vi. investigate instances of noncompliance; and
vii. comply with public participation requirements.

3. Funding
The POTW must have sufficient resources and qualified personnel to carry out the authorities and procedures specified in its approved pretreatment program.

4. Local limits
The POTW must develop local limits or demonstrate why these limits are not necessary.

5. Enforcement Response Plan (ERP)
The POTW must develop and implement an ERP that contains detailed procedures indicating how the POTW will investigate and respond to instances of IU noncompliance.

6. List of SIUs
The POTW must prepare, update, and submit to the Approval Authority a list of all Significant Industrial Users (**SIUs**).

Pretreatment Roles and Responsibilities

EPA Headquarters
< Oversees program implementation at all levels
< Develops and modifies regulations for the program
< Develops policies to clarify and further define the program
< Develops technical guidance for program implementation
< Initiates enforcement actions as appropriate

Regions
< Fulfill Approval Authority responsibilities for States without a State pretreatment program
< Oversee State program implementation
< Initiate enforcement actions as appropriate.

Approval Authorities (EPA Regions and delegated States)
< Notify POTWs of their responsibilities
< Review and approve requests for POTW pretreatment program approval or modification
< Review requests for site-specific modifications to categorical pretreatment standards
< Oversee POTW program implementation
< Provide technical guidance to POTWs
< Initiate enforcement actions, against noncompliant POTWs or industries.

Control Authorities (POTWs, States, or EPA Regions)
< Develop, implement, and maintain approved pretreatment program
< Evaluate compliance of regulated IUs
< Initiate enforcement action against industries as appropriate
< Submit reports to Approval Authorities
< Develop local limits (or demonstrate why they are not needed)
< Develop and implement enforcement response plan.

Industrial Users
< Comply with applicable pretreatment standards and reporting requirements.

What Types of Businesses are Subject to Pretreatment Regulations?

Pretreatment regulations apply to a variety of businesses discharging wastewater from industrial and commercial processes.

Certain types of industries with the potential to discharge pollutants are regulated through an industrial discharge permit system. Industries are considered Significant Industrial Users and therefore require a discharge permit if the user:

- Is subject to the Environmental Protection Agency's Categorical Pretreatment Standards. Categorical users receive increased scrutiny due to their potential to pollute. Examples of categorical users are metal finishers and pharmaceutical manufacturers.
- Is discharging an average of 25,000 gallons per day or more of process wastewater.
- Has the potential to adversely affect the wastewater utility.

Industry-Specific Guides
Aluminum, Copper, And Nonferrous Metals Forming And Metal Powders

- Pretreatment Standards: A Guidance Manual
- Guidance Manual For Battery Manufacturing Pretreatment Standards
- Guidance Manual for Electroplating and Metal Finishing Pretreatment Standard
- Guidance Manual For Iron And Steel Manufacturing Pretreatment Standards
- Guidance Manual for Leather Tanning and Finishing Pretreatment Standards
- Guidance Manual for Pulp, Paper, and Paperboard and Builders' Paper and
- Board Mills Pretreatment Standards

Pretreatment Standards

The National Pretreatment Program identifies specific requirements that apply to all IUs, additional requirements that apply to all SIUs, and certain requirements that only apply to CIUs. The objectives of the National Pretreatment Program are achieved by applying and enforcing three types of discharge standards:

< *prohibited discharge standards*
< *categorical standards*
< *local limits*.

Prohibited Discharge Standards

All IUs, whether or not subject to any other National, State, or local pretreatment requirements, are subject to the general and specific prohibitions identified in 40 CFR §§403.5(a) and (b), respectively. General prohibitions forbid the discharge of any pollutant(s) to a POTW that cause pass through or interference (Figure 10). Specific prohibitions forbid eight categories of pollutant discharges as follows:
(1) discharges containing pollutants which create a fire or explosion hazard in the POTW, including but not limited to, wastestreams with a closed cup flashpoint of less than 140°F (60°C) using the test methods specified in 40 CFR §261.21;
(2) discharges containing pollutants causing corrosive structural damage to the POTW, but in no case discharges with a pH lower than 5.0, unless the POTW is specifically designed to accommodate such discharges;
(3) discharges containing pollutants in amounts causing obstruction to the flow in the POTW resulting in interference;
(4) discharges of any pollutants released at a flow rate and/or concentration which will cause interference with the POTW;
(5) discharges of heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40°C (104°F) unless the Approval Authority, upon request of the POTW, approves alternative temperature limits;
(6) discharges of petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
(7) discharges which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems; and
(8) discharges of trucked or hauled pollutants, except at discharge points designated by the POTW.

Compliance with the general and specific prohibitions is mandatory for all IUs, although a facility may have an affirmative defense in any action brought against it alleging a violation of the general prohibitions or of certain specific prohibitions [(3), (4), (5), (6) and (7) above] where the IU can demonstrate it did not have reason to know that its discharge, alone or in conjunction with a discharge or discharges from other sources, would cause pass through or interference, and the IU was in compliance with a technically-based local limit developed to prevent pass through or interference. These prohibited discharge standards are intended to provide general protection for POTWs. However, their lack of specific pollutant limitations creates the need for additional controls, namely categorical pretreatment standards and local limits.

Interference and Pass Through
Pass through - A discharge which exits the POTW into waters of the US in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW’s NPDES permit (including an increase in the magnitude or duration of a violation).

Interference - A discharge which, alone or in conjunction with a discharge or discharges from other sources, both (1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and (2) therefore is a cause of a violation of any requirement of the POTW’s NPDES permit or of the prevention of sewage sludge use or disposal.

Categorical Pretreatment Standards

Categorical pretreatment standards (i.e., categorical standards) are national, uniform, technology-based standards that apply to discharges to POTWs from specific industrial categories (i.e., **indirect dischargers**) and limit the discharge of specific pollutants. Categorical pretreatment standards for both existing and new sources (PSES and PSNS, respectively) are promulgated by the EPA pursuant to Section 307(b) and (c) of the CWA. Limitations developed for indirect discharges are designed to prevent the discharge of pollutants that could pass through, interfere with, or otherwise be incompatible with POTW operations. Effluent limitations guidelines (**ELGs**), developed in conjunction with categorical standards, limit the discharge from facilities directly to waters of the U.S. (i.e., **direct discharger**s) and do not apply to indirect dischargers.

ELGs include Best Practicable Control Technology Currently Available (**BPT**), Best Conventional Pollutant Control Technology (**BCT**), and Best Available Technology Economically Achievable (**BAT**) limitations and New Source Performance Standards (**NSPS**). ELGs (i.e., BPT, BCT, BAT, and NSPS) do not apply to indirect dischargers. The significant difference between categorical standards and effluent limitations guidelines is that categorical standards account for any pollutant removal that may be afforded through treatment at the POTW while effluent limitations guidelines do not. Industries identified as major sources of toxic pollutants are typically targeted for effluent guideline and categorical standard development.

If limits are deemed necessary, the EPA investigates affected IUs and gathers information regarding process operations and treatment and management practices, accounting for differences in facility size and age, equipment age, and wastewater characteristics.

Sub categorization within an industrial category is evaluated based on variability in processes employed, raw materials used, types of items produced, and characteristics of wastes generated. Availability and cost of control technologies, non-water quality environmental impacts, available pollution prevention measures, and economic impacts are then identified prior to the EPA's presentation of findings in proposed development documents and publishing a notice of the proposed regulations in the *Federal Registe*r. Based on public comments on the proposed rule, the EPA promulgates (i.e., publishes) the standards.

Self-Monitoring
Sampling and analyses performed by a facility to ensure compliance with a permit or other regulatory requirements.

Definition of New Source (40 CFR 403.3(k))

New Source is defined at 40 CFR §403.3 (k)(1) to mean any building, structure, facility or installation from which there is or may be a discharge of pollutants, the construction of which commenced after publication of proposed Pretreatment Standards under Section 307(c) of the Act which will be applicable to such source if Standards are thereafter promulgated in accordance with that section, *provided that:*
(i) the building, structure, facility, or installation is constructed at a site at which no other source is located; or
(ii) the building, structure, facility, or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
(iii) the production or wastewater generating processes of the building, structure, facility or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant, and the extent to which the new facility is engaged in the same general type of activity as the existing source should be considered.
(2) Construction on a site at which an existing source is located results in a modification rather than a new source if the construction does not create a new building, structure, facility, or installation meeting the criteria of paragraphs (k)(1)(ii), or (k)(1)(iii) of this section but otherwise alters, replaces, or adds to existing process or production equipment.
(3) Construction of a new source as defined under this paragraph has commenced if the owner or operator has:
(i) begun, or caused to begin as part of a continuous onsite construction program:
(ii) any placement, assembly or installation of facilities or equipment, or
(B) significant site preparation work, including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment; or
(ii) entered into a binding contractual obligation for the purchase of facilities or equipment which are intended to be used in its operation within a reasonable time.
Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation under this paragraph.

New Source
As noted above, categorical pretreatment standards are developed both for existing (**PSES)** and new sources (**PSNS**). Facilities are classified as either PSES or PSNS based on the definition of “**new source**" set out in 40 CFR§403.3(k) of the General Pretreatment Regulations. Dischargers subject to PSES are required to comply with those standards by a specified date, typically no more than three years after the effective date of the categorical standard. Users subject to PSNS, however, are required to achieve compliance within the shortest feasible time, not to exceed 90 days from commencement of discharge. PSNS are often more stringent than PSES based on the opportunity for new sources to install the best available demonstrated technology and operate the most efficient production processes.

Congress established an initial list of 21 categorical industries under Section 306 of the CWA of 1972. As a result of various court decrees and settlement agreements resulting from litigation, and from the EPA's internal work plan development process, the EPA has developed effluent guidelines (for direct dischargers) and/or categorical pretreatment standards (for indirect dischargers) for 51 industrial categories.

Of these industrial categories, the EPA implements pretreatment standards for 32 categories, and either requires compliance solely with 40 CFR Part 403 General Pretreatment Regulations or does not address pretreatment standards for the remaining categories.

Plans for the EPA's expansion and modification of the list is detailed in the *Effluent Guidelines Plan,* published in the *Federal Register* biennially as required in section 304(m) of the CWA. A list of the industrial categories that have categorical standards is provided as Figure 13. Categorical pretreatment standards developed can be concentration-based or mass-based.

Concentration-based standards are expressed as milligrams of pollutant allowed per liter (mg/l) of wastewater discharged and are issued where production rates for the particular industrial category do not necessarily correlate with pollutant discharges. Mass-based standards are generally expressed on a mass per unit of production (e.g., milligrams of pollutant per kilogram of product produced, pounds of pollutant per million cubic feet of air scrubbed, etc.) and are issued where water conservation is an important component in the limitation development process.

For a few categories where reducing a facility's flow volume does not provide a significant difference in the pollutant load discharged, the EPA has established both mass and concentration-based standards. Generally, both a daily maximum limitation and a long-term average limitation (e.g., average daily values in a calendar month) are established for every regulated pollutant.

Primary Wastewater Treatment Clarifier

Summary of Categorical Pretreatment Standards *Figure 13*

Category	40 CFR Part	Subparts	Type of Standard Overview of Pretreatment Standards
Aluminum Forming	467 A-F	PSES PSNS	Limits are production-based, daily maximums and monthly averages. Subpart C prohibits discharges from certain operations.
Battery Manufacturing	461 A-G	PSES PSNS	Limits are production-based, daily maximums and monthly averages. No discharge is allowed from any process not specifically identified in the regulations.
Builders' Paper and Board Mills	431 A	PSES PSNS	Limits are production-based daily maximums. These facilities may certify they do not use certain compounds in lieu of performing monitoring to demonstrate compliance.
Carbon Black Manufacturing	458 A-D	PSNS	Limits are for Oil & Grease only (no limit duration specified).
Coil Coating	465 A-D	PSES PSNS	Limits are production-based, daily maximums and monthly averages.
Copper Forming	468 A	PSES PSNS	Limits are production-based, daily maximums and monthly averages.
Electrical and Electronic Components	469 A-D	PSES PSNS	Limits are concentration-based, daily maximums and 30 day averages or monthly averages (varies per subpart and pollutant parameter). Certification is allowed in lieu of monitoring for certain pollutants when a management plan is approved and implemented.
Electroplating	413 A-B, D-H	PSES	Limits are concentration-based (or alternative mass-based equivalents), daily maximums and four consecutive monitoring days averages. Two sets of limits exist, depending on if facility discharges more or less than 10,000 gallons per day of process wastewater. Certification is allowed in lieu of monitoring for certain pollutants when a management plan is approved and implemented.
Feedlots	412 B	PSNS	Discharge of process wastewater is prohibited, except when there is an overflow resulting from a chronic or catastrophic rainfall event.
Fertilizer Manufacturing	418 A-G	PSNS	Limits may specify zero discharge of wastewater pollutants (Subpart A), production-based daily maximums and 30-day averages (Subparts B-E) or concentration-based (Subparts F-G) with no limit duration specified.
Glass Manufacturing	426 H, K-M	PSNS	Limits are either concentration- or production-based, daily maximums and monthly averages.
Grain Mills	406 A	PSNS	Discharge of process wastewater is prohibited at a flow rate or mass loading rate which is excessive over any time period during the peak load at a POTW.
Ink Formulating	447 A	PSNS	Regulations specify no discharge of process wastewater pollutants to the POTW.
Inorganic Chemicals Manufacturing	415 A-BO	PSES PSNS	Limits vary for each subpart with a majority of the limits concentration-based, daily maximums and 30-day averages, or may specify no discharge of wastewater pollutants. Numerous subparts have no pretreatment standards.
Iron and Steel Manufacturing	420 A-F, H-J, L	PSES PSNS	Limits are production-based, daily maximums and 30 day averages.
Leather Tanning and Finishing	425 A-I	PSES PSNS	Limits are concentration-based, daily maximums and monthly averages. In certain instances, production volume dictates applicable pretreatment standards.
Metal Finishing	433 A	PSES PSNS	Limits are concentration-based, daily maximums and monthly averages. Certification is allowed for certain pollutants where a management plan is approved and implemented.
Metal Molding and Casting	464 A-D	PSES PSNS	Limits are primarily production-based, daily maximums and monthly averages. Discharges from certain processes are prohibited (Subparts A-C).
Nonferrous Metals Forming and Metal Powders	471 A-J	PSES PSNS	Limits are production-based, daily maximums and monthly averages. In some instances, the regulations prohibit the discharge of wastewater pollutants.
Nonferrous Metals Manufacturing	421 B-AE	PSES PSNS	Limits are production-based, daily maximums and monthly averages. The majority of the Subparts have both existing and new source limits, with others having solely new source requirements.

Summary of Categorical Pretreatment Standards *Figure 13*

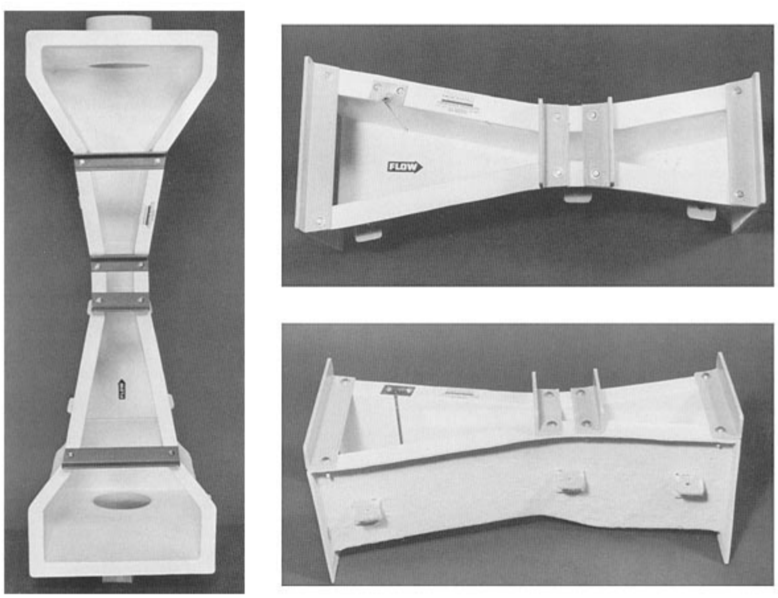
Organic Chemicals, Plastics, and Synthetic Fibers	414 B-H, K	PSES PSNS	Limits are mass-based (concentration-based standards multiplied by process flow), daily maximums and monthly averages. Standards for metals and cyanide apply only to metal- or cyanide-bearing wastestreams.
Paint Formulating	446 A	PSNS	Regulations specify no discharge of process wastewater pollutants to the POTW.
Paving and Roofing Materials (Tars and Asphalt)	443 A-D	PSNS	Limits are for Oil & Grease only (no limit duration specified).
Pesticide Chemicals	455 A, C, E	PSES PSNS	Limits are mass-based (concentration-based standards multiplied by process flow), daily maximums and monthly averages. Subpart C specifies no discharge of process wastewater pollutants but provides for pollution prevention alternatives. Subpart E specifies no discharge of process wastewater pollutants.
Petroleum Refining	419 A-E	PSES PSNS	Limits are concentration-based (or mass based equivalent), daily maximums.
Pharmaceutical Manufacturing	439 A-D	PSES PSNS	Limits are concentration-based, daily maximums and monthly averages. These facilities may certify they do not use or generate cyanide in lieu of performing monitoring to demonstrate compliance.
Porcelain Enameling	466 A-D	PSES PSNS	Limits are concentration-based (or alternative production-based), daily maximums and monthly averages. Subpart B prohibits discharges certain operations.
Pulp, Paper, and Paperboard	430 A-G, I-L	PSES PSNS	Limits are production-based daily maximums and monthly averages. These facilities may certify they do not use certain compounds in lieu of performing monitoring to demonstrate compliance. Facilities subject to Subparts B and E must also implement Best Management Practices as identified.
Rubber Manufacturing	428 E-K	PSNS	Limits are concentration- or production-based, daily maximums and monthly averages.
Soap and Detergent Manufacturing	417 O-R	PSNS	Regulations specify no discharge of process wastewater pollutants to the POTW.
Steam Electric Power Generating	423 N/A	PSES PSNS	Limits are either concentration-based, daily maximums, or “maximums for any time”, or compliance can be demonstrated through engineering calculations.
Timber Products Processing	429 F-H	PSES PSNS	All PSNS (and PSES for Subpart F) prohibit the discharge of wastewater pollutants. PSES for Subparts G and H are concentration-based, daily maximums (with production-based alternatives).

CWF vs. FWA

Categorical standards apply to regulated wastewaters, i.e. wastewater from an industrial process that is regulated for a particular pollutant by a categorical pretreatment standard. Therefore, demonstrating compliance with categorical pretreatment standards is intended to be based on measurements of wastestreams containing only the regulated process wastewater. However, recognizing isolation of regulated wastestreams from nonregulated wastestreams was not always practicable or desirable, the EPA developed the combined wastestream formula (**CWF**) and flow weighted average (**FWA**) approach for determining compliance with combined wastestreams.

Pursuant to 40 CFR §403.6(e), the CWF is applicable where a regulated wastestream combines with one or more unregulated or dilute wastestreams prior to treatment. Where nonregulated wastestreams combine with process streams after pretreatment, the more stringent approach (whether CWF or FWA) is used to adjust the limits. The CWF and FWA approaches differ primarily in their allowances for nonregulated wastestreams. While the CWF provides a ***"full credit"*** (i.e., same pollutant levels as regulated wastestreams) for unregulated wastestreams yet no credit for dilute wastestreams, the FWA requires sampling and analysis of the untreated, nonregulated wastestreams to determine the credit to be granted (not to exceed that allowed for the regulated wastestreams).

Application of the CWF and FWA requires proper identification, classification, and quantification of the three wastestream types (Figure 16.) **Note:** in circumstances where boiler blowdown, noncontact cooling water, stormwater, or demineralized wastestreams contain a significant amount of a regulated pollutant, and the treatment of the wastewater with the regulated wastestream results in substantial reduction of the regulated pollutant, the Control Authority can classify the wastestream as unregulated rather than as a dilute wastestream.



Measuring device known as a *"Parshall Flume"*

Parshall Flumes

Parshall Flume provides both accuracy and rangeability. Dimensions and capacities are in accordance with those published in the U.S. Department of the Interior's Water Measurement Manual.

Parshall Flumes are a primary flow element for flow measurement in open channels. The big advantages of Parshall Flumes are their self-cleaning capabilities, low head loss, single-head measurement, and wide operating range.

While commonly used in rectangular channels, they can also be adapted for use in circular channels. Flumes feature stiffening ribs, braces and anchor clips. Options include stilling well, staff gauge, flow sensors, adaptors, etc.

Clarification
Clarification on category-specific wastestream classifications may be provided by consulting the applicable regulation(s) and associated development documents, since wastestream types are addressed in the effluent guideline and categorical standard development process. When in doubt, the Control Authority can always require the CIU to monitor the wastestream(s) in question to quantify the presence (or lack thereof) of categorically regulated pollutants.

Reasonably accurate flow data must also be obtained for each wastestream type flowing through the monitoring point to ensure categorical pretreatment standards are adjusted accordingly.

Proper application of the CWF or FWA will result in:

- alternative limits being established for each regulated pollutant in each regulated process;
- both daily maximum and long-term average (i.e., 4-day, 30-day, or monthly) alternative limits being calculated for each regulated pollutant;

Figure 16. Wastestream Types

Regulated

Wastewater from an industrial process that is regulated for a particular pollutant by a categorical pretreatment standard.

Nonregulated, Unregulated

Wastestreams from an industrial process that are not regulated for a particular pollutant by a categorical pretreatment standard and are not defined as a dilute wastestream, e.g.:
< a process wastestream for which categorical standards have been promulgated but for which the deadline for compliance has not yet been reached.
< a process wastestream that currently is not subject to categorical pretreatment standards
< a process wastestream that is not regulated for the pollutant in question but is regulated for other pollutants.

Dilute

Wastestreams which have no more than trace or non-detectable amounts of the regulated pollutant. Defined in 40 CFR § 403.6(e)(1) of the General Pretreatment Regulations to include sanitary wastestreams, demineralized backwash streams, boiler blowdown, noncontact cooling water, storm water, and process wastestreams from certain standards based on the findings that these wastewaters contained none of the regulated pollutant or only trace amounts of it.

The EPA's *Guidance Manual for the Use of Production Based Pretreatment Standards and the Combined Wastestream Formula* should be consulted for more information on the proper application and adjustment of categorical pretreatment standards.

Although categorical standards are established based on a particular industrial category, the EPA provides several options for unique circumstances that justify adjustment of categorical standards for an individual facility:

CHECKLIST EXAMPLE FOR ASSESSMENT OF PERMANENTLY INSTALLED FLOWMETERS

COMPANY NAME:		TYPE OF PRIMARY DEVICE:
SITE CODE #		SIZE:
ADDRESS:		
DIMENSIONS OF VAULT:	DEPTH OF VAULT:	

TAKE PICTURES!

1. IS FLUME LEVEL?

2. HEIGHT MEASUREMENT FROM TOP OF FLUME TO BOTTOM OF PERMANENT TRANSDUCER:

3. HOW HIGH DOES THE LEVEL GET IN FLUME?

4. DAILY MAXIMUM FLOW (CONVERTED TO LEVEL):

5. CAN YOU SETUP OUR TRANSDUCER UNDER OR NEXT TO THEIRS, WITHOUT DISTURBING THEIRS?

6. IS THEIR PERMANENT TRANSDUCER SETUP OVER THE PROPER MEASURING POINT ON THE FLUME?

7. RECORD ANY PROBLEMS WITH THE WAY THE PERMANENT TRANSDUCER / FLOWMENTER IS SETUP:

8. COMMENTS____

Removal Credits

40 CFR §403.7 details the conditions by which a Control Authority may demonstrate consistent removal of pollutants regulated by categorical standards at their POTW, and in so doing, may extend removal credits to industries on a pollutant-specific basis to prevent redundant treatment. Removal credits are available for a pollutant if the pollutant is regulated by the sewage sludge use or disposal option employed by the POTW making the application request, or if the pollutant is listed in 40 CFR Part 403, Appendix G.

Also, the availability of removal credits is not limited to Appendix G pollutants for POTWs that dispose of sewage sludge in municipal solid waste landfills. Steps for developing such a request are in the EPA's *Guidance Manual for the Preparation and Review of Removal Credit Application*s.

Fundamentally Different Factors Variance Section 301(n) of the CWA authorizes adjustments of categorical pretreatment standards for existing sources who demonstrate they have factors which are fundamentally different from the factors the EPA considered during standards development (40 CFR §403.13). Variance requests must be based solely on information and data submitted during the development of the categorical standards and the adjusted effluent limitations must neither be more nor less stringent than justified by the fundamental difference nor result in a non-water quality environmental impact markedly more adverse than the impact considered by the EPA when developing the categorical standard.

Successful requests must detail factors well outside the range considered by the EPA in establishing the standard and not merely factors deviating from the average. Further, differences must not be similar to a significant number of other facilities in the category. A facility must request a variance in writing no later than 180 days after publication of a categorical Pretreatment Standard in the Federal Register.

Net/Gross Adjustment Categorical Pretreatment Standards

Net/Gross Adjustment Categorical pretreatment standards can be adjusted to reflect the presence of pollutants in a CIU's intake waters (40 CFR §403.15). To obtain a net/gross credit, the CIU must submit a formal written request to the Control Authority that demonstrates:

- Its intake water is drawn from the same body of water that the POTW discharges into (this can be waived if the Control Authority finds no environmental degradation will result);
- The pollutants present in the intake water will not be entirely removed by the treatment system operated by the CIU; and
- The pollutants in the intake water do not vary chemically or biologically from the pollutants limited by the applicable standard.

Inherent in this provision is the requirement that the CIU employ a treatment technology capable of meeting the categorical pretreatment standard(s). Net/gross adjustments should not be granted to CIUs that have no treatment. Further, credits are only granted to the extent necessary to meet the applicable standard(s), up to a maximum value equal to the influent value.

Innovative Technology--in accordance with 307(e) of the CWA, existing CIUs choosing to install an innovative treatment system may receive approval from the Control Authority for up to a two year extension to their applicable categorical pretreatment standards compliance deadline, provided:

- The innovative treatment has a reasonable potential to result in significantly greater pollutant removal or equivalent removal at a substantially lower cost than the technologies considered by the EPA when developing the categorical standard;
- The innovative technique has the potential for industry-wide application; and
- The proposed compliance extension will not cause or contribute to the violation of the POTW's NPDES permit.

While policy has been established for universal categorical variance requests, occasionally, a Control Authority may merely need assistance to classify a CIU and/or to determine applicable categorical limitations. Provisions in the General Pretreatment Regulations allow POTWs and IUs to request an EPA category determination for a specific IU within 60 days after the effective date of the standard in question [40 CFR §403.6(a)].

Even after the formal timeframe for requesting a categorical determination, the EPA (and states) will assist POTWs and IUs with categorization issues. Such requests, however, do not affect applicable reporting requirements, including timely requests submitted under 40 CFR §403.6(a). Additionally, the EPA has addressed universal CIU questions posed by Control Authorities in various memoranda and guidance:

Research and Development (R&D) Facilities

Unless specifically addressed in the categorical regulation or associated development document, R&D facilities where there is no commercial sale of products from the facility, are not subject to categorical standards.

Should an R&D facility need pollution controls to comply with prohibited discharge standards and/or local limits, the development documents may serve as guidance on the performance of pollution control technologies.

Certification Statements

In lieu of requiring self-monitoring, some standards allow CIUs to certify that they do not use, generate or discharge a regulated pollutant [e.g. Pulp, Paper and Paperboard facilities can certify that chlorophenolic compounds are not used (40 CFR Part 430) and Pharmaceutical Manufacturing facilities can certify that cyanide is not used or generated (40 CFR Part 439)]. Facilities providing such certifications are still considered CIUs, and therefore are subject to other pretreatment standards and requirements.

Lack of specific categorical effluent limitations IUs subject to PSES or PSNS that merely require compliance with 40 CFR Part 403 are not considered CIUs. However, these users may still be classified as SIUs and are still subject to the general and specific prohibitions and any local limits.

Total Toxic Organics (TTO)

Seven categorical regulations currently limit the discharge of TTO:

- **40 CFR Part 413 - Electroplating**
- **40 CFR Part 433 - Metal Finishing**
- **40 CFR Part 464 - Metal Molding and Casting**
- **40 CFR Part 465 - Coil Coating**
- **40 CFR Part 467 - Aluminum Forming**
- **40 CFR Part 468 - Copper Forming**
- **40 CFR Part 469 - Electrical and Electronic Components (Phase I and II)**

For each of these standards, TTO refers to the sum of the masses or concentrations of certain toxic organic pollutants found in the regulated discharge at a concentration greater than 0.01 milligrams per liter (mg/l).

However, the toxic organic pollutants regulated by the TTO limit are specific to each industrial category. Further, industrial categories may provide some flexibility with regard to monitoring and/or reporting requirements as follows:

✓ 40 CFR Parts 413 and 433 allow development and implementation of a Toxic Organic Management Plan (**TOMP**) in lieu of routine monitoring while 40 CFR Part 469 allows development and implementation of a Solvent Management Plan. Upon approval of these plans by the Control Authority, the CIU can demonstrate compliance with TTO requirements by certifying that the facility is adhering to this Plan to prevent organics from being discharged to the POTW. A specific certification statement must be signed and provided to the Control Authority on a regular basis.

✓ 40 CFR Parts 464, 465, 467, and 468 allow an option to demonstrate compliance with an Oil and Grease limit in lieu of demonstrating compliance with a TTO limit. The option chosen by the CIU must be utilized for all reports required (i.e., BMR, 90-daycompliance report, and periodic compliance reports).

The EPA's *Guidance Manual for Implementing Total Toxic Organics (TTO) Pretreatment Standards* should be consulted for more information on TTO.

MAHL MAIL

Maximum Allowable Headworks Loading Method (MAHL)
Pollutant by pollutant, treatment plant data are used to calculate removal efficiencies, before applying the most stringent criteria (i.e., water quality, sludge quality, NPDES permit, or pollutant inhibition levels) to back-calculate the MAHLs. Subtracting out contributions from domestic sources, the available industrial loading is then either evenly distributed among the IUs, or allocated on an as needed basis to those IUs discharging the pollutant above background levels.

Maximum Allowable Industrial Load (MAIL)
The MAIL is the total daily mass that a POTW can accept from all permitted IUs and ensure the POTW is protecting against pass through and interference.

Headworks' "Rotating Barscreens"

Headworks flooding or overflowing because of high grease loading

LOCAL LIMITS OBSERVATION SHEET *Example*

SITE DESCRIPTION:

SITE CODE #: **DATE:**

TIME	pH	TEMP.	RES.CL_2	INITIALS
0900				
1200				
1430				
1700				
2000				
2230				
0100				
0430				

DAILY TOTAL FLOW:

PICKLE JAR IW#			
FIELD COMP IW#			
VOC's IW#			
TPH IW#			

SAMPLES COLLECTED

PARAMETER	YES	NO	PARAMETER	YES	NO
601/602 (HOW MANY)			BOD, COD, TSS		
8240 (HOW MANY)			NO_2/NO_3		
SULFIDES			METALS		
TKN			608		
AMMONIA (NH_4)			1657		
CN			625		
TPH (HOW MANY)			8270		
8140			8080		

IF NO SAMPLE COLLECTED, RECORD ON BACK AS TO WHY.

More on Local Limits

Prohibited discharge standards are designed to protect against pass-through and interference generally. Categorical pretreatment standards, on the other hand, are designed to ensure that IUs implement technology-based controls to limit the discharge of pollutants. Local limits, however, address the specific needs and concerns of a POTW and its receiving waters.

Federal regulations at 40 CFR §§403.8(f)(4) and 122.21(j)(4) require Control Authorities to evaluate the need for local limits and, if necessary, implement and enforce specific limits as part of pretreatment program activities. Local limits are developed for pollutants (e.g. metals, cyanide, BOD5 TSS, oil and grease, organics) that may cause interference, pass through, sludge contamination, and/or worker health and safety problems if discharged in excess of the receiving POTW treatment plant's capabilities and/or receiving water quality standards.

Typically, local limits are developed to regulate the discharge from all IUs, not just to CIUs, and are usually imposed at the "**end-of-pipe**" discharge from an IU (i.e., at the point of connection to the POTW's collection system). In evaluating the need for local limit development, it is recommended that Control Authorities:

- Conduct an industrial waste survey to identify all IUs that might be subject to the pretreatment program;
- Determine the character and volume of pollutants contributed to the POTW by these industries;
- Determine which pollutants have a reasonable potential for pass through, interference, or sludge contamination;
- Conduct a technical evaluation to determine the maximum allowable POTW treatment plant headworks (influent) loading for at least arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, silver, and zinc (Figure19);
- Identify additional pollutants of concern;
- Determine contributions from unpermitted sources to determine the maximum allowable treatment plant headworks loading from "controllable" industrial sources (Figure 20);
- Implement a system to ensure these loadings will not be exceeded.

Other local limit approaches available to Control Authorities include:
Collection System Approach Pollutants found to be present which may cause fire and explosion hazards or other worker health and safety concerns, are evaluated for their propensity to volatilize and are modeled to evaluate their expected concentration in air. Comparisons are made with worker health exposure criteria and lower explosive limits. Where values are of concern, the Control Authority may set limits or require development of management practices to control undesirable discharges.

The collection system approach may also consider the prohibition of pollutants with specific flashpoints to prevent discharges of ignitable wastes. The EPA's *Guidance to Protect POTW Workers from Toxic and Reactive Gases and Vapors* details strategies for developing such local limits.

Industrial User Management Practice Plans
These plans typically consist of narrative local limits requiring IUs to develop management practices (e.g., chemical management practices, best management practices, and spill prevention plans) for the handling of chemicals and wastes.

The need for and suggested contents of such plans may be found in the EPA's *Control of Slug Loadings to POTWs: Guidance Manua*l, and *Spill Prevention, Control, and Countermeasure (SPCC) Information Guid*e.

Case-by-Case Discharge Limits

These numeric local limits are based on best professional judgment (**BPJ)** and available pollution prevention and treatment technologies which are known to be economically feasible. This approach is most often used when insufficient data are available to employ the methods outlined above.

Local Specific Prohibitions

POTW specific prohibitions may be imposed in addition to the prohibitions detailed in 40 CFR § 403.5 (a) & (b) to address hydraulic, pollutant specific, and/or aesthetic concerns; e.g.:

- Noxious or malodorous liquids, gases, or solids creating a public nuisance.
- Wastestreams which impart color and pass through the POTW treatment plant.
- Storm water, roof runoff, swimming pool drainage.
- Wastewaters containing radioactive wastes or isotopes.
- Removed substances from pretreatment of wastewater.

Regardless of the approaches taken by a Control Authority, local limits should correct existing problems, prevent potential problems, protect the receiving waters, improve sludge use options, and protect POTW personnel. Additional existing EPA guidance on the subject includes:

- *Guidance for Preventing Interference at POTWs*
- *Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program*
- *Supplemental Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program: Residential and Commercial Toxic Pollutant Loadings and POTW Removal Efficiency Estimation*
- *Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluent*s.

Additionally, many EPA Regions and States have developed local limits guidance to address regional and state issues.

Summary of Standards

A summary of all of the pretreatment standards, including general and specific prohibitions, categorical pretreatment standards, and local limits.

	General and Specific Prohibitions	**Categorical Pretreatment Standards**	**Local Limits**
Development	Established at the Federal level	Established at the Federal level	Developed by Control Authorities
Reference	40 CFR 403.5(a) & (b)	40 CFR Parts 405-471	Requirements for development found in 40 CFR §§403.5(c) & 403.8(f)(4)
Applicability	All IUs	CIUs	Commonly all IUs or all SIUs, but depends on allocation method used when developing limits.
Purpose	Provide for general protection of the POTW. May be superseded by more stringent categorical pretreatment standards or local limits.	Minimum standards based on available treatment technology and pollution prevention measures for controlling non-conventional and toxic pollutants that may cause pass through, interference, etc. at the POTW. May be superseded by more stringent local limits.	Provide site specific protection for a POTW and its receiving waters. May be superseded by more stringent categorical standards.
All standards are considered pretreatment standards for the purpose of section 307(d) of the Clean Water Act. A POTW is responsible for identifying standard(s) applicable to each industrial user and applying the most stringent requirements where multiple provisions exist. Compliance with imposed standards can be achieved through implementation of best management practices, development of a pollution prevention program, and/or installation of pretreatment.			

Chapter 3

POTW Pretreatment Program Responsibilities

This Chapter provides an overview of these POTW programs, highlighting each of the specific program areas that are to be addressed.

Legal Authority

POTWs seeking pretreatment program approval must develop policy and procedures for program implementation and establish the legal authority to implement and enforce program requirements. The General Pretreatment Regulations do not provide Control Authorities with the legal authority to carry out their pretreatment programs; rather, the regulations set forth the minimum requirements for POTWs with pretreatment programs.

A Control Authority's legal authority actually derives from State law. Therefore, State law must confer the minimum Federal legal authority requirements on a Control Authority. Where deficient, State law must be modified to grant the minimum requirements. In order to apply regulatory authority provided by State law, it is generally necessary for the Control Authority to establish local regulations to legally implement and enforce pretreatment requirements. Where the Control Authority is a municipality, legal authority is detailed in a Sewer Use Ordinance (SUO), which is usually part of city or county code.

Regional Control Authorities frequently adopt similar provisions in the form of "**rules and regulations**." Likewise, State agencies implementing a Statewide program under 40 CFR §403.10(e) set out pretreatment requirements as State regulations, rather than as an SUO. **[Local regulations cannot give the Control Authority greater authority than that provided by State law.]**

The EPA's 1992 guidance, *EPA Model Pretreatment Ordinance* provides a model for POTWs that are required to develop pretreatment programs. As POTW service areas expand, new contributions may arise from "**extrajurisdictional**" IUs located outside of the Control Authority's legal jurisdiction (see Figure 22). Multijurisdictional arrangements require special legal/contractual mechanisms to ensure adequate authority to implement and enforce program requirements in these other jurisdictions. Some state statutes may provide for general extraterritorial powers (i.e., a Control Authority is automatically allowed to regulate extrajurisdictional IUs contributing to their system).

However, the extent to which authorities (i.e., to permit, inspect, enforce, monitor, etc.) are granted may be somewhat limited, thereby, restricting a Control Authority's ability to implement and enforce a program. Where obtaining authority from the State to regulate extrajurisdictional IUs is not feasible, other options may be pursued:

Districts The creation of an independent organization (by affected municipalities or the State) which is authorized to administer and enforce an approved pretreatment program for the entire area in which it provides services is common in areas where multiple POTWs each serve various jurisdictions.

Agreements Affected Control Authorities may opt to enter into agreements requiring each municipality to implement and enforce the approved pretreatment program covering all IUs within their jurisdiction. The Control Authority must retain the means to regulate extrajurisdictional IUs where the contributing jurisdiction's efforts are inadequate. It is essential that agreements clearly define the roles of each party.

Annexation Where extra jurisdictional IUs lie in unincorporated areas, a Control Authority may annex or utility annex the service area.

Contracts
A Control Authority may enter into a contract with an extrajurisdictional IU, although contracts generally limit the enforcement capabilities of the Control Authority. As such, contracts should only be pursued when all other means fail. Since procedures for obtaining jurisdiction, creating sanitary districts, annexing service areas, etc. vary among states, Control Authority personnel should consult with their legal staff to thoroughly examine options allowed. This may include requesting State legislative changes if necessary.

The EPA's 1994 *Multijurisdictional Pretreatment Programs - Guidance Manual* provides more information on these jurisdictional issues, including sample language for agreements and contracts.

Industrial Waste Surveys
As part of program development and maintenance, the Federal regulations [40 CFR §403.8(f)(2)(I)] require Control Authorities to identify and locate all IUs that might be subject to the pretreatment program. While the General Pretreatment Regulations do not specify how a Control Authority is to accomplish this, it is beneficial to conduct an initial in-depth survey, then institute measures to update the list continuously.

Control Authorities must ensure that the entire service area is reviewed. This may include IUs located outside the jurisdictional boundaries of the POTW. In these instances, it may be appropriate to solicit assistance from other jurisdictions in developing the list of potential dischargers. The types of resources that may be consulted in compiling and updating the master list include:

- Water and sewer billing records
- Applications for sewer service
- Local telephone directories
- Chamber of Commerce and local business directories
- Business license records
- POTW and wastewater collection personnel and field observations
- Business associations
- Internet

Once IUs are identified, the Control Authority must classify these users to determine if pretreatment standards and requirements should apply to these facilities. Typically, the Control Authority develops and distributes an Industrial Waste Survey (IWS) questionnaire to the identified IUs. The IWS questionnaire requests information regarding IU activities and the nature of wastes discharged.

The Control Authority may opt to send a detailed IWS questionnaire initially or conduct the survey in two phases (i.e., send a screener requesting basic information to eliminate obvious facilities and then send a detailed IWS to those facilities with greater potential to be SIUs). Key to the IWS is to identify facilities that are subject to categorical standards (i.e., CIUs) or otherwise have the potential to impact the POTW (i.e., SIUs). A POTW's IU inventory should include the name, location, classification, applicable standards, basis for limits imposed, volume of discharge, control mechanism status, compliance dates and other special requirements for each IU.

The IWS should provide most of the information required to develop the inventory, although some supplementary information might be required from other sources, such as the permit application or monitoring data. The IU inventory must be updated as needed [40 CFR §403.8(f)(2)(I)] and provided to the Approval Authority as part of the annual report requirement (see POTW Reports section in this Chapter). The ongoing task of maintaining a complete list of IUs requires the Control Authority to implement a system to track existing IU information and/or classification changes and new user information. Some Control Authorities may proactively opt to institute a "**utility connect questionnaire**" program. These types of forms are completed when a customer applies for new utility service (e.g., water, sewerage, or electricity).

Monthly Average
The arithmetic average value of all samples taken in a calendar month for an individual pollutant parameter. The monthly average may be the average of all grab samples taken in a given calendar month, or the average of all composite samples taken in a given calendar month.

Permitting

The General Pretreatment Regulations require all IUs be controlled through permit, order, or similar means to ensure compliance with applicable pretreatment standards and requirements. Section 403.8(f)(1)(iii)(A-E) clarifies this requirement to specify that all SIUs be issued a permit or equivalent individual control mechanism which contains, at a minimum:

- Statement of duration (not to exceed five years);
- Statement of nontransferabililty (unless outlined provisions are met);
- Effluent limitations based on applicable standards;
- Self-monitoring, sampling, reporting, notification, and record-keeping requirements;
- Statement of applicable civil and criminal penalties; and a schedule of compliance (where appropriate).

The EPA's 1989 *Industrial User Permitting Guidance Manual* details procedures for drafting IU discharge permits. SIU permits issued are site specific and tailored to the unique circumstances of the IU. Permit conditions must establish clear and explicit requirements for the permittee, to include using such terms such as "**shall**" and "**must**" in lieu of vague terms such as "**recommend**" or "**may**". The Control Authority must document its decision-making process when developing permits to ensure defensibility and enforceability. Adherence to sound, documented procedures will prevent any arbitrary and capricious claims by the permittee.

Whether developing or reissuing a permit, the permitting process consists of three phases:
Phase I - Collection and verification of information
Phase II - Data interpretation and fact sheet development
Phase III - Permit development and issuance.

Phase I
As part of Phase I, Control Authorities may review and verify information contained in the permit application, perform an inspection of the IU for confirmation of facts, tally data, and potentially sample and analyze the IU's wastestream. Knowledgeable Control Authority personnel, effective communication, and SIU cooperation are essential to collection of complete and accurate information.

Phase II requires that the Control Authority interpret data and other information and document the permit decision-making rationale, preferably in a permit fact sheet. Although the contents of a fact sheet will vary by permittee, fact sheets should provide a justification of all permitting decisions.

Typical components of a fact sheet are provided. Completed fact sheets should be included as part of the permit and provided to the Permittee to document the soundness of permitting decisions. For CIUs:

Components of Permit Fact Sheet

- the basis for the categorical determination(s)
- the identity and flow volume of all wastestreams generated and discharged to the POTW, and classified accordingly (i.e., regulated, unregulated, or dilution)
- data used and/or justification for estimates used to determine categorical limitations
- basis for limits imposed for categorical parameters.

For SIUs/CIUs:

- basis for limits imposed for non-categorical parameters
- rationale for compliance schedules, special plans required, special conditions, etc.
- basis for monitoring and reporting frequencies.

Inspection Considerations

- Provide current data on IUs
- Confirm or determine IUs' compliance status
- Determine completeness and accuracy of the IU's performance/compliance records
- Assess the adequacy of the IU's self-monitoring and reporting requirements
- Assess the adequacy of monitoring locations and IU's sampling techniques
- Assess the adequacy of imposed limitations and pollutants of concern
- Develop rapport with IUs
- Evaluate operation and maintenance and overall performance of an IU's pretreatment system
- Assess the potential for spills and slug loadings
- Evaluate the effectiveness of slug control plan
- Reveal issues requiring action
- Identify noncompliance needing resolution
- Suggest pollution prevention opportunities
- Collect samples
- Obtain data to support enforcement actions

After all permitting decisions are made, the Control Authority must incorporate those decisions into a permit. The permit, signed by the specified Control Authority official, is provided to the Permittee for comment and after comments are addressed, a final permit is issued to the IU. While many comments may be easily addressed/resolved by the Control Authority, occasionally resolution must be obtained through a formal adjudicatory hearing process where both the Permittee and Control Authority present their case to a third party.

Non-SIUs

Many POTWs also control contributions from non-SIUs using various means, such as through general permits issued to an entire industrial sector. These types of control mechanisms may not necessarily require compliance with specific pollutant limitations.
For example:

- ✓ Grease trap maintenance and record keeping requirements for food establishments;
- ✓ Maintenance and record-keeping requirements for photo processors' silver reclamation units;
- ✓ Best management practices for mercury recovery by hospitals and dentists.

Permit Application

All industrial users that require a permit must be sampled to determine the characteristics of the wastes to be discharged into the POTW's sewer system. Prior to the issuance of a permit for existing industrial users, the POTW's Inspector or Water Quality Department/Pollution Control Division samples the user's effluent, and performs the analyses required by the applicable discharge standards (i.e., Categorical standards or local limits).

For new industrial users, estimates of the wastes to be discharged into the POTW's sewer system must be submitted along with the permit application. No sampling would be performed at these new facilities, since they do not presently discharge wastes into the sewer system.

A four-day sampling program is usually conducted at each site to collect both composite and grab (for pollutants not amenable to composite sampling) samples as needed.

Industrial Sector

Industrial sector general permitting programs are common where a real or potential POTW problem is linked to a particular pollutant discharged (e.g., collection system blockages caused by the discharge of excess oils and grease from food establishments). POTWs have authority to enforce their SUO or rules or regulations against non-SIUs without the need for any type of individual control mechanism. Control Authorities have the authority to require non-SIUs to comply with pretreatment standards and requirements contained in their local regulations and then take appropriate actions against IUs as noncompliance is identified.

Inspections

Control Authorities are required to inspect and sample all SIUs a minimum of once per year pursuant to 40 CFR §403.8(f)(2(v). The frequency with which a Control Authority actually inspects an SIU may vary depending on issues such as the variability of an SIU's effluent, the impact of their discharge on the POTW, and their compliance history.

Inspection considerations (see Figure 24) will hinge upon the type of inspection performed (i.e., scheduled, unscheduled or demand).

The EPA's 1994 *Industrial User Inspection and Sampling Manual for POTWs* provides a detailed reference for inspection procedures and protocols. Scheduled inspections are useful when the Control Authority wants to gather specific information from the facility that necessitates meeting with specific SIU contacts. However, since scheduled inspections may interrupt normal operations (e.g., altered production schedule as a result of preparative work undertaken by the IU), unscheduled inspections may more accurately reflect IU compliance status when the inspection is performed for that reason.

POTWs must evaluate, at least once every two years, whether each SIU needs a plan to control slug discharges (i.e., a discharge of a non-routine, episodic nature, including but not limited to an accidental spill or non-customary batch discharge). To accurately evaluate the slug potential, Control Authorities likely will have to examine the SIU during normal operating conditions. If undetected, slug discharges can have serious impacts on the POTW.

The EPA's 1991 *Control of Slug Loadings to POTWs Guidance Manual* provides a description of procedures for development, implementation, and review of slug control plans. Demand inspections are non-routine in nature and occur in response to a concern (e.g., POTW collection problems downstream from an IU, elevated enforcement actions against an IU, suspicious IU behavior, or an informer complaint).

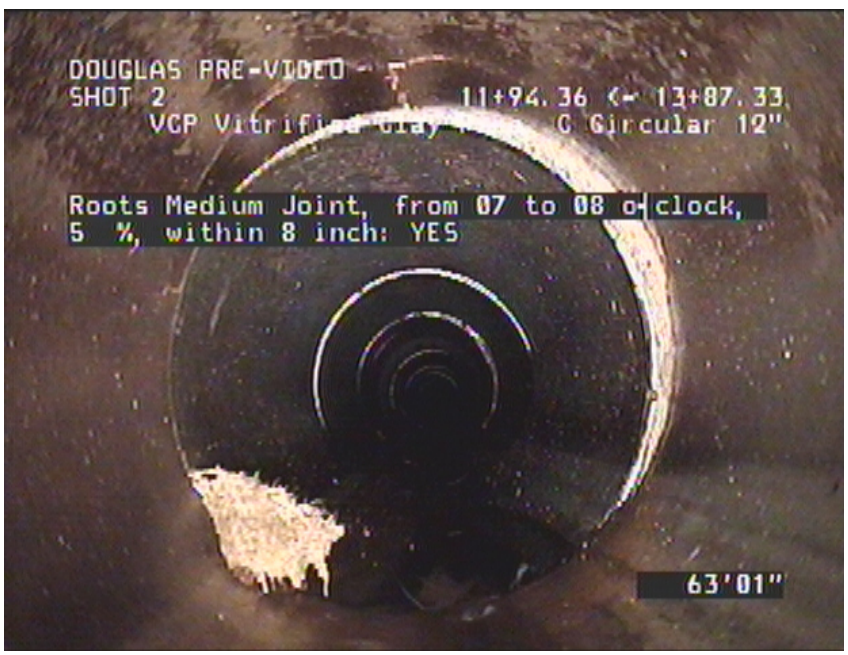
Routine Control Authority inspections of SIUs typically consist of three activities; preparation, on-site assessment, and follow-up.

Preparation
Control Authority personnel should review POTW records for SIUs to be inspected to familiarize themselves with the facility. Information reviewed may include compliance status, compliance schedule activities, reports and plans, upcoming report and plan due dates, enforcement activities, permit applications, waste surveys, previous inspection summaries, categorical regulations, water use/billing records, and POTW collection system maps.

Control Authority personnel should also be familiar with any specific issues and concerns regarding the POTW treatment plant or collection system problems receiving the SIU's discharge.

On-site Assessment
Control Authority personnel typically discuss IU operations with IU contacts and perform a walkthrough of the facility to: update IU information regarding contacts, processes, production rates, pretreatment, and other waste management activities; review records required to be kept by the IU; visually verify the need for a slug control plan; and review pretreatment system maintenance, categorical standards applicable to processes employed, metering and sampling equipment, sampling procedures, chemicals used, processes employed, management practices, containment structures, locations of floor drains, etc. Many POTWs have developed a standard inspection questionnaire to facilitate the interview process and promote consistency during the inspection.

Follow-up
An inspection report should be prepared as soon as possible after the inspector returns to the office. Unanswered questions, required permit modifications, and/or necessary enforcement actions should be processed in a timely manner. Non-routine inspections (e.g., demand) may not encompass all the activities and steps specified above, but, like routine inspections, these activities may provide the Control Authority an opportunity to collect samples of the IU’s discharge.



Parshall Fume and Ultrasonic Flow Meter.

Notice the debris, most POTW's will write a NOV for uncleanness, the POTW's that do not write NOV's will usually not have an ordinance in place.

Sewer System Evaluation

On a regular basis, selected locations in the sewer system are sampled to develop background data for purposes of updating the local limits, and to screen areas for higher than "**background**" pollutant levels. In addition, problem areas are sampled on an as needed basis to determine potential sources of Code violations that either occur on a frequent basis, or are the result of a slug load to the sewer system.

To monitor sewers for background information, the sampling program would typically be conducted over a four-day period. In instances where the intent is to determine sources of pollutants and/or slug loads, the length of the program would vary.

Multi-City Users (Metering Stations) Example
All wastewater, which is transported to the POTW Treatment Plant from the Multi-City users, must be analyzed for pollutants of concern to the Industrial Pretreatment Program.

This type of sampling program is conducted over a five-day period to obtain four days of sampling data at each sewer location (i.e., a metering station) on a quarterly basis.

Once the sampling dates have been determined, the Inspector will notify, in writing, the Subregional Organizational Group (**SROG**) representative for that City of the dates when the sampling will be conducted.

Upon arrival at the site, safety is the priority. A visual inspection must be completed prior to any entry. The site must be free of any obstructions or hazards which may cause injury when entering the sampling area. If there are any problems detected, the SROG representative and the Inspector should be notified, and no entry should be attempted until the problem has been corrected.

Metering stations qualify as confined spaces (Example Policy)
If all safety criteria has been met, prepare equipment for the site. Check the assignment sheet to determine what parameters are required to be sampled, which in turn determines the type of tubing to be used (i.e. Tygon or Teflon).

The sampler must be completely assembled before performing QA/QC procedures. After QA/QC is complete, a sufficient amount of weight must be attached to the tubing to keep the strainer submerged in the effluent for proper siphoning of the sample, without allowing the strainer to hit the bottom of the flume. Make sure the intake tubing does not kink.

If the metering station has a flow meter, you may connect either their cable or a POTW cable to the sampler from the flow meter. Occasionally, you will set up a flow meter to have a comparison reading. Determine the pulse rate and proper setting from the flow, and program the sampler. After entering the data into the sampler, wait to make sure the equipment is pulling samples.

After the initial set-up of the sampling equipment, samples will be collected during the remainder of the sampling period. Split samples may be requested by the SROG representative. If the volume of the sample is adequate, these may be given, provided the representative supplies the containers and allows the City Inspector to pour off the samples.

No grab samples will be collected by POTW Inspectors for any SROG representatives. (Example Policy)

Upon exiting the confined space, continue to follow the confined space entry procedures as outlined by OSHA Standards. When you return to the sampling vehicle, you must immediately perform field tests and preserve the samples according to the techniques set forth in by Standard Methods or the State/Federal Rule.

All paper work must be filled out completely before the sampling crew's departure. This paperwork includes the chain of custody which is turned in to the laboratory with the samples, "Metering Station Field Observation Form" that remains with the sampling site file, and the Multi-City Metering Station Sample Record, of which the original is given to the Inspector and the copy is given to the SROG representative.

If there is not an SROG representative at the site, these copies will be turned over to the Inspector with the originals at the end of the week. Remember, all paperwork must be completed prior to leaving the site.

Compliance Monitoring

There are two types of sampling activities that are performed as part of compliance monitoring for permitted industries: unscheduled and demand.

Unscheduled sampling is used to determine the compliance status of the user. Instances of noncompliance are often identified during unannounced monitoring visits. No notice is given for this type of sampling. This type of sampling is performed two to four times a year, at each industrial user site, over a two to five-day period to obtain sampling data

Demand sampling is usually initiated in response to a known or suspected violation, discovered as a result of a self monitoring report, routine sampling visit, public complaint, unusual influent condition at the wastewater treatment plant, or emergency situations (e.g., plant upsets, sewer line blockages, fires, explosions, etc.). Most often, this type of sampling is conducted to support enforcement actions against an industrial user. This type of sampling activity is performed on an as needed basis.

The length of the sampling program depends on the flow, nature of the wastes, and type of samples (i.e., grab or composite) to be collected.

Typically, composite and grab samples are collected at each user site.

Nonpermitted Industrial Users (User Rate Charge Program) (Example Policy)

On a periodic basis (i.e., once every two to three years), commercial and minor industrial users are sampled to determine discharge concentrations of various pollutants. Typical types of users which may be sampled include: restaurants, photo processing laboratories, laundries, car washes, and printing shops.

A three- to four-day sampling program is usually conducted at each assigned site. Commercial establishments are sampled to establish BOD and SS levels for various groups of users for the Finance/ Utilities department.

This activity is also helpful in identifying industrial or commercial users which may discharge pollutants of concern.

Chapter 4 Sampling

The General Pretreatment Regulations require Control Authorities to monitor each SIU at least annually and each SIU to self-monitor semi-annually. As with inspections, the Control Authority should assess site-specific issues, such as SIU effluent variability, impact of this effluent on the POTW, and the SIU's compliance history to determine appropriate sampling frequencies (i.e., if more frequent monitoring is necessary).

For more detailed information on sampling frequencies, consult the EPA's 1994 *Industrial User Inspection and Sampling Manual for POTWs*.

Parameter	Sample type	Container	Preservative	Holding time
pH	Grab	Polyethylene or Glass	N/A	analyze immediately
BOD	Composite	Polyethylene or Glass	chilled to 4°C	48 hours
TSS	Composite	Polyethylene or Glass	chilled to 4°C	7 days
NH_3 as N	Composite	Polyethylene or Glass	chilled to 4°C, H_2SO_4 to pH<2	28 days
Oil and Grease	Grab	Glass	chilled to 4°C, HCl or H_2SO_4 to pH<2	28 days
Cyanide, total	Grab	Polyethylene or Glass	chilled to 4°C, NaOH to a pH >12, and 0.6g of ascorbic acid if residual chlorine is present	14 days
Metals (total) excl. Cr^{+6} B, and Hg	Composite	Polyethylene or Glass	HNO_3 to pH<2	6 months
624 (volatiles organics)	Grab	Amber glass, w/ Teflon septum lid and zero headspace	chilled to 4°C (additional laboratory preservation required)	7 or 14 days, depending on specific organic
625 (semi-volatile organics)	Composite	Amber glass w/ Teflon lined lid	chilled to 4°C (additional laboratory preservation required)	7 days for sample prep; 40 days for extract

Types of Samples

General

There are four types of samples that are collected by the POTW's Sampling Section: grab, time proportional composites, flow proportional composites, and hand composites. The sampling method used depends largely on the types of analyses to be run, and the nature of the wastestream being sampled. Each sampling method is described in this section.

Most POTW's will define the sampling methods which must be used by industrial users (**IUs**) to obtain representative samples to show compliance with their permits: ***Example***

(1) A grab sample is an individual sample collected in less than 15 minutes without regard for flow or time of day. pH, cyanide, oil and grease, sulfide, and volatile organics must be collected as grab samples.

(2) 24-hour flow proportional composite samples where feasible. The POTW may waive this requirement if the IU demonstrates that this method is not feasible. Samples would then be taken by means of time proportional composite sampling methods, or by hand composite where the IU can demonstrate that this will provide a representative sample of the effluent being discharged.

The volume of sample to be collected by any of these methods is dependent on the number and types of analyses that must be performed.

Grab Samples

Grab samples are individual samples collected in less than 15 minutes without regard to flow or time of day. Grab samples are normally taken manually, but can be pumped. Oil and grease samples and purgeable organics are exceptions and must be taken manually. A grab sample is usually taken when a sample is needed to:

(1) Provide information about an instantaneous concentration of pollutants at a specific time.

(2) Quantify the pollutants in a non-continuous discharge (e.g., batch discharge).

(3) Corroborate composite samples if the waste is not highly variable.

(4) Monitor parameters not amenable to compositing such as pH, temperature, dissolved oxygen, chlorine, purgeable organics and sulfides, oil and grease, coliform bacteria, and sulfites.

Collecting Procedure for Water/Wastewater Grab Samples

- Lower dipper or mouth of the bottle into water just below surface. In some cases, you will need to rinse the bottle or dipper three times in the sample before obtaining the sample.
- Retrieve the collected sample to a clean processing area.
- Rinse the outside of the bottle 3 times to remove any contaminants.
- Pour the sample into the required laboratory bottle.
- You may need to filter the sample; this is true with some water and wastewater samples. Filtering (for ortho-P and NOx samples)--some Surface water virus samples need to be filtered.
- Bottle preservation is performed in the truck or lab before sampling.
- Secure sample container caps tightly.
- Label the sample containers and place them in an iced cooler before storage.

Timed Composites

Timed samples are usually taken in instances where the intention is to characterize the wastes over a period of time without regard to flow, or where the flow is fairly constant.

Timed composite samples consist of a series of equal volume grab samples taken at regular intervals. Usually the interval is 15 minutes, with a maximum sampling duration of 24 hours.

However, other intervals can be used and may be more appropriate under some circumstances.

Samplers are available which can take up to 10 discreet samples per bottle, for a total of 240 discreet samples. The sampler may be programmed to take any number of samples into one composite bottle which has a 2.5-gallon capacity.

Flow Proportional Composites

Flow proportional composite samples consist of: a series of grab samples whose volumes are equal in size and proportion to the flow at the time of sampling. Samples are taken at varying time intervals, or continuous samples taken over a period of time based on the flow. Wherever possible, flow proportional sampling is recommended because it most accurately reflects the nature of the wastestream. Equal volume samples taken at varying time intervals are most often collected by the sampling inspectors. A flow measuring device must be used in conjunction with the automatic sampler.

This sampling method is used for all sampling activities except for instances where grab samples are required or time proportional sampling is more expedient and can provide the same accuracy as flow proportional sampling (i.e., constant flow levels).

Hand Compositing

Hand compositing is a series of time proportional grab samples which are collected and composited by hand. Provided the sample volumes are equal and are collected at even intervals, the results should be the same as if done by an automatic sampler (i.e., flow proportional composite sampling).

A specific instance where this sampling method may be used is in metal plating shops which have batch discharges from the treatment tank.

Provided the tank contains a homogeneous mixture, a minimum of four grab samples are taken of equal amounts and at evenly spaced intervals of time during discharge, to accurately represent the entire tank.

This should represent the waste characteristics of the entire batch discharge to the sewer. One hand composite per batch discharge would be equivalent to a 24-hour composite sample taken at other types of facilities. The sampling data would be compared with the average daily categorical standards or local limits where applicable.

Pre-Sampling Procedures

To ensure acceptable analytical results, numerous steps must be followed before a sampling program can be initiated:

(1) Sampling equipment must be clean and be in good working order.
(2) Sampling site must be selected.
(3) Types of analyses must be determined.
(4) Proper sample containers must be selected and prepared.

Sampling Equipment Example

The POTW may use one of the following portable samplers, ISCO Ultra-Sonic flow meters, SIGMA Depth Sensor samplers, and SIGMA pH Probe samplers. Safety equipment and other necessary equipment are also used.

The equipment that is kept in the sampling vehicle is dependent on the types of sampling activities planned each week, while the equipment stored in the storeroom is for back-up needs and future sampling demands.

Each sampling vehicle should be equipped with at least one sampler and one flow meter more than is needed for the particular sampling period. For example, three scheduled flow proportionate sampling sites would require a vehicle to be equipped with four samplers and four flow meters. At least one spare battery for each type of equipment taken into the field should also be placed in the sampling vehicle.

Auxiliary equipment, such as supports, harnesses, blowers, etc., that must be carried in each vehicle will depend on the nature of the sampling location.

In order to keep the equipment in good working order, the equipment should be maintained and cleaned on a regular basis. Routine maintenance and cleaning procedures should be written into your standard operating procedures.

Sampling Equipment Maintenance Example

Basic maintenance for samplers includes: periodic calibration and general equipment checking, and replacement of the internal desiccant and fuses. Routine cleaning should be done as covered in SOP.

Basic maintenance of the flow meters includes: periodic replacement of the internal desiccant, plotter paper, ribbon, fuses, and any broken re-roll spool assemblies. **Note: on the flow meters there are two tabs on the sides which are extremely thin and easily broken.**

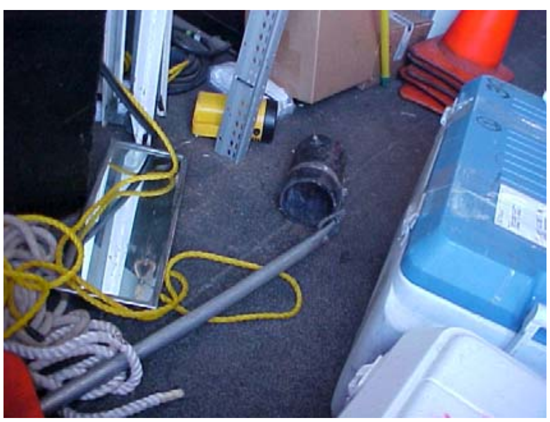
The NiCad and Gel Cell batteries need to be recharged on a regular basis. Any battery that reads less than 12.50 when checked should not be installed or left on any of the sampling equipment. At the battery charging station, areas are set aside for batteries that need to be charged and batteries already charged.

To prolong battery life, NiCad batteries should be fully discharged before recharging for a maximum of 24 hours, in accordance with the procedures described in the manufacturer's operations and maintenance manuals. Always bring a second set or back-up set of batteries with you.

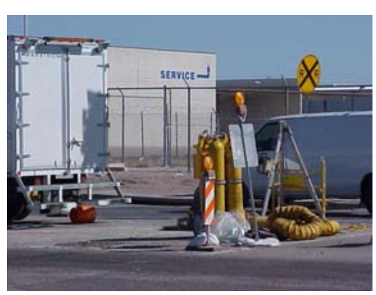
It is important to note that charged NiCad batteries, if left unused for a long time, are nevertheless slowly discharging. Gel cell batteries are generally more stable. Voltage readings should be taken **before** the charged batteries are taken into the field to be sure that they still have a full charge.

When a sampler, flow meter, or ancillary equipment needs more specific repairs, the manufacturer representative should be contacted and arrangements made for repair or replacement of the equipment.

Modern Wastewater Sampling Trucks



Wastewater sampler set-up in traffic to obtain composite sample from a sewer manhole. Notice the tri-pod and barricades.



Sampling

Sampling is the most appropriate method for verifying compliance with pretreatment standards. Monitoring location(s) are designated by the Control Authority and must be such that compliance with permitted discharge limits can be determined. Where possible, the Control Authority should not designate monitoring locations that are confined spaces or that are difficult to access or difficult to place the automated sampling equipment.

Monitoring locations should:
- be appropriate for waste stream conditions;
- be representative of the discharge;
- have no bypass capabilities; and
- allow for unrestricted access at all times.

Control Authorities should measure flow to allow for collection of flow-proportioned composite samples, which are required, unless flow-proportional sampling is not feasible. Flow-proportional composite samples are preferred over time composite samples particularly where the monitored discharge is intermittent or variable.

Desired analyses dictate the preparation protocols, equipment, and collection bottles to be used to avoid contamination of samples or loss of pollutants through improper collection. Sampling for such pollutants as pH, cyanide, oil and grease, flashpoint, and volatile organic compounds require manual collection of grab samples.

Similar to composite samples, grab samples must be representative of the monitored discharge and are to be collected from actively flowing wastestreams. Fluctuations in flow or the nature of the discharge may require collection of and hand-composting of more than one grab sample to accurately assess compliance.

To ensure defensibility of data, Control Authorities should develop and implement standard operating procedures and policies detailing sample collection and handling protocols in accordance with 40 CFR Part 136.

Adherence to proper sample collection and handling protocols, 40 CFR Part 136 approved analytical methodologies, and record-keeping requirements [40 CFR §403.12(o)(1)] (see Figure 25) can be verified through review of field measurement records, chain of custodies, and lab reports. Field measurement records may require information regarding sample location, condition of and programmed settings for sampling equipment, wastewater meter readings, and information for such parameters as pH and temperature which require analysis in the field.

Chain of custody forms serve as a link between field personnel and the laboratory and contain information regarding sample matrix, type, and handling. Lab reports should contain the minimum information specified in 40 CFR §403.12(o)(1)(ii-iv) as well as any additional information necessary to demonstrate compliance with 40 CFR Part 136 requirements (e.g., analytical methodology, sample preparation date and time, time of analysis).

Use of standardized forms which prompt recording of information necessary for demonstrating compliance with applicable requirements will aid in ensuring it can be used as admissible evidence in enforcement proceedings or in judicial actions.

Required Containers, Preservation Techniques, and Holding Times
40 CFR 136.3

Parameter No./name	Container	Preservation	Maximum holding time
Table IA--Bacteria Tests:			
1-4 Coliform, fecal and total.	P,G.............	Cool, 4C, 0.008% $Na_2S_2O_3$......	6 hours.
5 Fecal streptococci..........	P,G.............	Cool, 4C, 0.008% $Na_2S_2O_3$	6 hours.
Table IA--Aquatic Toxicity Tests:			
6-10 Toxicity, acute and chronic.	P,G...........	Cool, 4 deg.C	36 hours.
Table IB--Inorganic Tests:			
1. Acidity....................	P, G............	Cool, 4 deg.C..................	14 days.
2. Alkalinity.................	P, G............	Cool, 4 deg.C..................	14 days.
4. Ammonia....................	P, G............	Cool, 4 deg.C, H_2SO_4 to pH< 2.....	28 days.
9. Biochemical oxygen demand..	P, G............	Cool, 4 deg.C..................	48 hours.
10. Boron.....................	P, PFTE, or Quartz.	HNO_3 TO pH2....................	6 months.
11. Bromide...................	P, G............	None required..................	28 days.
14. Biochemical oxygen demand, carbonaceous.	P, G............	Cool, 4 deg.C..................	48 hours.
15. Chemical oxygen demand....	P, G............	Cool, 4 deg.C, H_2SO_4 to pH<2.....	28 days.
16. Chloride..................	P, G............	None required..................	28 days.
17. Chlorine, total residual..	P, G............	None required	Analyze immediately.
21. Color.....................	P, G............	Cool, 4 deg.C..................	48 hours.
23-24. Cyanide, total and amenable to chlorination.	P, G............	Cool, 4 deg.C, NaOH to pH>12, 0.6g Ascorbic acid	14 days.
25. Fluoride..................	P...............	None required..................	28 days.
27. Hardness..................	P, G............	HNO_3 to pH<2, H_2SO_4 to pH <2.......	6 months.
28. Hydrogen ion (pH).........	P, G............	None required..................	Analyze immediately.
31, 43. Kjeldahl and organic nitrogen.	P, G............	Cool, 4 deg.C, H_2SO_4 to pH <2.....	28 days.
Metals:			
18. Chromium VI...............	P, G............	Cool, 4 deg.C..................	24 hours.
35. Mercury...................	P, G............	HNO_3 to pH<2.................	28 days.
3, 5-8, 12, 13, 19, 20, 22, 26, 29, 30, 32-34, 36, 37, 45, 47, 51, 52, 58-60, 62, 63, 70-72, 74, 75. Metals, except boron, chromium VI and mercury.	P, G............	......do.......................	6 months.
38. Nitrate...................	P, G............	Cool, 4 deg.C..................	48 hours.
39. Nitrate-nitrite...........	P, G............	Cool, 4 deg.C, H_2SO_4 to pH <2.....	28 days.
40. Nitrite...................	P, G............	Cool, 4 deg.C..................	48 hours.
41. Oil and grease............	G...............	Cool to 4 deg.C, HCl or H_2SO_4 to pH <2 to	28 days.
42. Organic Carbon............	P, G............	Cool to 4 deg.C HC1 or H_2SO_4 to pH <2 or	28 days.
44. Orthophosphate............	P, G............	Filter immediately, Cool, 4 deg.C.	48 hours.
46. Oxygen, Dissolved Probe...	G Bottle and top.	None required..................	Analyze immediately.
47. Winkler..................	.... G Bottle and top.	Fix on site and store in dark...	8 hours.
48. Phenols...................	G only...........	Cool, 4 deg.C,..... H_2SO_4 to pH <2	28 days.
49. Phosphorus (elemental)....	G................	Cool, 4 deg.C..................	48 hours.
50. Phosphorus, total.........	P, G............	Cool, 4 deg.C, H_2SO_4 to pH <2…………..	28 days.
53. Residue, total............	P, G............	Cool, 4 deg.C..................	7 days.
54. Residue, Filterable.......	P, G............	Cool, 4 deg.C...................	7 days.
55. Residue, Nonfilterable (**TSS**).	P, G............	Cool, 4 deg.C.......................	7 days.
56. Residue, Settleable.......	P, G............	Cool, 4 deg.C.......................	48 hours.
57. Residue, volatile.........	P, G............	Cool, 4 deg.C......................	7 days.

61. Silica.................... P, PFTE, or Quartz…….. Cool, 4 deg.C.................. 28 days.
64. Specific conductance...... P, G.......... . Cool, 4 deg.C....................... 28 days.
65. Sulfate................... P, G............ ...... Cool, 4 deg.C .... 28 days.
66. Sulfide...... P, G............ Cool, 4 deg.C add zinc acetate plus sodium hydroxide to pH>9. 7 days.
67. Sulfite................... P, G............ None required.................. Analyze immediately.
68. Surfactants............... P ,G............ Cool, 4 deg.C.................. 48 hours.
69. Temperature............... P, G............ None required................... Analyze.
73. Turbidity................. P, G............ Cool, 4 deg.C................... 48 hours.

Table IC--Organic Tests

13, 18-20, 22, 24-28, 34-37, 39-43, 45-47, 56, 76, 104, 105, 108-111, 113. G, Teflon-lined septum Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ 14 days.

Purgeable Halocarbons. 6, 57, 106.

Purgeable aromatic hydrocarbons G, Teflon-lined septum Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ 14 days.

3, 4. Acrolein and acrylonitrile G, Teflon-lined septum Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ pH 4-5 14 days.

23, 30, 44, 49, 53, 77, 80, 81, 98, 100, 112. G, Teflon-lined Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ 14 days.

Phenols G, Teflon-lined septum Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ pH 4-5 7 days until extraction; 40 days after extraction. extraction.

7, 38. Benzidines G, Teflon-lined septum………… Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ 7 days until extraction.

14, 17, 48, 50-52. Phthalate G, Teflon-lined septum Cool, 4 deg.C.................. 7 days until extraction; esters 40 days after extraction.

82-84. Nitrosamines G, Teflon-lined septum ……Cool, 4 deg.C, 0.008% $NA_2S_2O_3$......Store in dark

88-94. PCBs G, Teflon-lined septum Cool, 4 deg.C .... 7 days until extraction; 40 days after extraction.

54, 55, 75, 79. Nitroaromatics ...... G, Teflon-lined septum…………Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ and isophorone

1, 2, 5, 8-12, 32, 33, 58, 59, 74, 78, 99, 101. Polynuclear aromatic hydrocarbons. Cool, 4 deg.C, 0.008% $NA_2S_2O_3$......Store in dark

15, 16, 21, 31, 87. Haloethers .... G, Teflon-lined septum....... Cool, 4 deg.C, 0.008% $NA_2S_2O_3$ 7 days until extraction; 40 days after extraction.

29, 35-37, 63-65, 73, 107. Chlorinated hydrocarbons G, Teflon-lined septum………….Cool, 4 deg.C, 7 days until extraction; 40 days after extraction.

60-62, 66-72, 85, 86, 95-97, 102, 103. CDDs/CDFs aqueous: field and lab preservation.. G...... Cool, 0-4 deg.C, pH9, 0.008% $NA_2S_2O_3$ 1 year.

Solids, mixed phase, and tissue: field preservation.. ......do......... Cool, 4 deg.C.................. 7 days.

Solids, mixed phase, and tissue: lab preservation. ......do......... Freeze, -10 deg.C............. 1 year.

Table ID--Pesticides Tests:

1-70. Pesticides \11\......... ......do......... Cool, 4 deg.C, pH 5-9 .... Do.

Table IE--Radiological Tests:

1-5. Alpha, beta and radium... P, G............ HNO_3 to pH2..................... 6 months.

See following page for chart abbreviations.

Sampling and Preservative Legend
Container Legend

Polyethylene (P) or glass (G). For microbiology, plastic sample containers must be made of sterilizable materials (polypropylene or other autoclavable plastic).

Preservation Legend
Sample preservation should be performed immediately upon sample collection. For composite chemical samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4 deg.C until composting and sample splitting is completed.

When any sample is to be shipped by common carrier or sent through the United States Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of Table II, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

Maximum Holding Times
Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that for the specific types of samples under study, the analytes are stable for the longer time, and has received a variance from the Regional Administrator under Sec. 136.**3**(e). Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show that this is necessary to maintain sample stability. See Sec. 136.**3**(e) for details. The term “analyze immediately" usually means within 15 minutes or less of sample collection.

*Should only be used in the presence of residual chlorine.

Maximum holding time is 24 hours when sulfide is present. Optionally all samples may be tested with lead acetate paper before pH adjustments in order to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.

Samples should be filtered immediately on-site before adding preservative for dissolved metals.

Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

Samples receiving no pH adjustment must be analyzed within seven days of sampling.

The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within **3** days of sampling.

When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to 4 deg.C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6-9; samples preserved in this manner may be held for seven days before extraction and for forty days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (re the requirement for thiosulfate reduction of residual chlorine), and footnotes 12, 13 (re the analysis of benzidine).

If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0<plus-minus>0.2 to prevent rearrangement to benzidine.

Extracts may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.

For the analysis of diphenylnitrosamine, add 0.008% $NA_2S_2O_3$ and adjust pH to 7-10 with NaOH within 24 hours of sampling.

The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $NA_2S_2O_3$.

Sufficient ice should be placed with the samples in the shipping container to ensure that ice is still present when the samples arrive at the laboratory. However, even if ice is present when the samples arrive, it is necessary to immediately measure the temperature of the samples and confirm that the 4°C temperature maximum has not been exceeded. In the isolated cases where it can be documented that this holding temperature cannot be met, the permittee can be given the option of on-site testing or can request a variance.

The request for a variance should include supportive data which show that the toxicity of the effluent samples is not reduced because of the increased holding temperature.

Metals Sampling *(Example Procedure)*

Metals sampling will encompass a variety of individual samples within a sample, i.e., nickel, zinc, silver and others. As a general rule, metals samples need to be collected as a composite and preserved with 1:1 nitric acid to pH < 2.

If ICP (inductively coupled plasma) laboratory analysis will be used, a 500 ml sample is sufficient. ICP is used for a general scan; if more stringent detection limits are needed then furnace analysis is used.

If additional analysis is required, i.e., furnace method analysis, collect a 2 liter bottle of sample (instead of the 500 ml sample) and preserve with nitric acid.

Ice is not necessary for preservation, but it won't jeopardize the sample, either.

PARAMETER	CONTAINER	PRESERVATIVE	MAX. HOLDING TIME
Metals	P	HNO3 to pH < 2	6 months

Common Wastewater Sample Collection Bottles

625/608, 1657, TTO/Organics, TPH/Oil/Grease,
Smaller bottles-TOCs, VOCs, 601/602 and 502.2

NO_2/NO_3, Fluoride, Sulfide, Metals, BOD-TDS-TSS
Wide-mouth Sludge/Metals bottle

Laboratory
123 W. Main St
Sun City, Arizona 85541

LAB I.D. NUMBER

Sampler:

DATE:

PAGE **1** OF **1**

Company:
Department:
Address:
Contact:
Telephone:

Sample Identification	Date	Time	Matrix	Lab ID	Metals* See Attached	TSS	Lead/Copper	BOD/COD	Nitrate	Nitrate + Nitrite	TKN / Amonia	VOC / THM's	Semi Volital Organics (625)	Chloride		Cyanide	Floride	Surfactants (MBAS)	Tot. Coliform MPN	Fecal Coliform MPN-HPC	Organo-Phosphorus Pest. (8141)	Sulfate	EC Conductivity	Number/Containers

Project Name

Project Number

Field Measurements:

pH:

Temp:

Sample Receipt

No. Containers:

Custody Seals:

Received Intact: Yes No

Received Cold: Yes No

Temperature:

PRIORITY:

RELINQUISHED BY:

Signature: Time:

Printed Name: Date:

SAMPLED RECEIVED BY:

Signature: Time:

Printed Name: Date:

RELINQUISHED BY:

Signature: Time:

Printed Name: Date:

Company

SAMPLED RECEIVED BY:

Signature: Time:

Printed Name: Date:

Company

Wastewater Treatment Plant Sampling

POTW samples are collected in accordance with the National Pollutant Discharge Elimination System (**NPDES**) permit that sets discharge limits for certain pollutants and specifies sampling frequencies and sample types.

The POTW is responsible for coordinating the plant sampling activity with laboratory personnel who prepare any special sampling bottles and laboratory appurtenances necessary (i.e. trip blanks, etc.) to complete the sampling objectives.

Plant Sampling Procedure *(Example Procedure)*
Set up two samplers at the plant influent channel and two samplers at the plant effluent channel. Two samplers are used to provide sufficient sample quantity and to minimize sampler failure. All sampling equipment must be prepared and cleaned as established in your POTW's procedures. Teflon hose is required. Sampling sites are specified in each plant's NPDES permit.

Collect the following composite samples at both sites.

(1) **Metals Sample** - (one 2-liter plastic bottle)

Preserve with 1:1 nitric acid to a pH < 2. Store sample on ice at 4°C.

(2) **Cyanide Sample** – (one 2-liter plastic bottle)

Collect the cyanide sample as a composite in accordance with NPDES permit. Check the sample for chlorine. If Cl_2 is present, use ascorbic acid to eliminate it. Add NaOH to a pH > 12. Store samples on ice at 4°C.

(3) EPA Test Method 608 and 625[i] samples are informational samples only. These results are used for local limits data.

608 and 625 samples are collected as composite samples. At the influent channel: Collect one 1-liter amber glass bottle of each sample (608, 625). Check samples for chlorine. At the effluent channel: Collect one 4-liter amber glass bottle of each sample (608, 625). Check samples for chlorine. If Cl_2 is present in the samples, use sodium thiosulfate ($Na_2S_20_3$) to eliminate it. Store samples on ice at 4°C.

(4) **625/Phenols** are collected as a grab sample. Collect one 4-liter amber glass bottle at the effluent channel only. Check the sample for chlorine. If Cl_2 is present, use sodium thiosulfate ($Na_2S_20_3$) to eliminate it. Store sample on ice at 4°C.

Bio-Solids Sampling *(Example Procedure)*

Bio-solids (dried sludge) samples are collected at POTWs.

Normally, bio-solid samples will be collected from the final storage area for dry sludge. The location of the dried bio-solids may vary based on the individual plants. Sampling frequency will be determined on an as needed basis and to comply with the EPA requirements.

All samples collected are grabs. All samples are collected using a sterile plastic scoop in order to avoid any contamination.

The following is a list of samples to be collected:

PARAMETER	CONTAINER
Helminth Ova & Enteric Virus	1 Qt Plastic Bag (Ziploc)
Metals +	500 ml Plastic Bottle
Nitrogen (total)	4 oz Glass Bottle
TOC (Total Organic Carbon)	4 oz Glass Bottle
Fecal Coliform	(autoclaved from lab)
6 hr hold time	500 ml Plastic Bottle

Sample Scheduling
An active file is maintained on each sampling location which contains historical data including past process discharge flow readings, water meter readings, sampling dates, and conditions of sampling site.

River Sampling Activities *(Example Procedure)*
When developing a sampling plan for river sampling, the following considerations must be observed:

(1) Sampling sites must meet the objectives of the program or study.

(2) At the sampling sites the river must be flowing freely and the sample must be as representative as possible of river flow at that site. Consideration of all safety factors must be observed.

(3) Samples must be collected midstream of the main channel at approximately two-thirds of the depth unless specific depths have been requested.

(4) All safety precautions must be observed during sampling which includes the use of harnesses, waterproof boots and other equipment.

Sewers *(Example Procedure)*
Sewer system and user rate sampling are conducted in manholes. General guidelines for selection of sampling locations include the following:

(1) Samples should be taken at points of high turbulent flow to ensure good mixing and prevent the deposition of solids.

(2) The sample location should be easily accessible and free of any major safety hazards.

(3) Sample lines should not be located where there is surface scum.

(4) If a flow study or a flow/proportional sampling event is required, make sure that the sewer pipe does not have a curve, a drop in the line or any obstructions. These would cause false readings.

Cleaning Automatic Samplers *(Example Procedure)*

Samplers, sample jars, grab beakers, and all other equipment used in collecting samples must be cleaned between their use at each site, to avoid the possibility of cross contamination. Latex or nitrile gloves should be worn to protect against infections and acid burns. The following steps should be taken to ensure the proper cleaning of the sampling equipment.

(1) Break down the sampler and lay the three components in a row.

(2) Place the strainers and weights in a plastic bucket.

(3) Set the glass composite jars and Teflon caps off to the side, to be cleaned separately from the samplers.

(4) Pour a small amount of diluted (1:128) O-Syl disinfectant and MICRO soap into each sampler component, the bucket containing the strainers and weights, and the composite jars.

(5) To clean the sampler components:

(a) Partially fill the sampler bases and cover with water.

(b) Use a brush to scrub the inside and outside of each sampling component. Using a small bottle brush, thoroughly scrub the inside of the intake tube and the float housing of the sampler head (these are critical areas since they come in contact with the sample).

(c) Rinse off the soap with fresh water.

(d) Stack each component so that it will dry quickly and thoroughly.

(e) Reassemble the sampler after the components are dry, and store it in the proper compartment of the sampling van. Leave the sampler lid loose so moisture won't be trapped.

(f) Clean the strainers and weights in the bucket. Empty the contents of the bucket and rinse the bucket, strainers, and weights. After they have dried, place them in the proper storage areas of the sampling van.

(g) Drain the wastewater tank of the sampling van into the sewer drain.

(h) Refill the fresh-water tank on the sampling van with potable water.

Sampler Bottle Cleaning and Preparation *(Example Procedure)*

(1) Fill each jar with O-Syl (same dilution as used in the sampler disinfection), MICRO soap, and fresh water.

(2) Thoroughly scrub the inside and outside of the jars until they are sparkling clean. Make sure that all oil and grease are removed.

(3) Rinse the jars with fresh water.

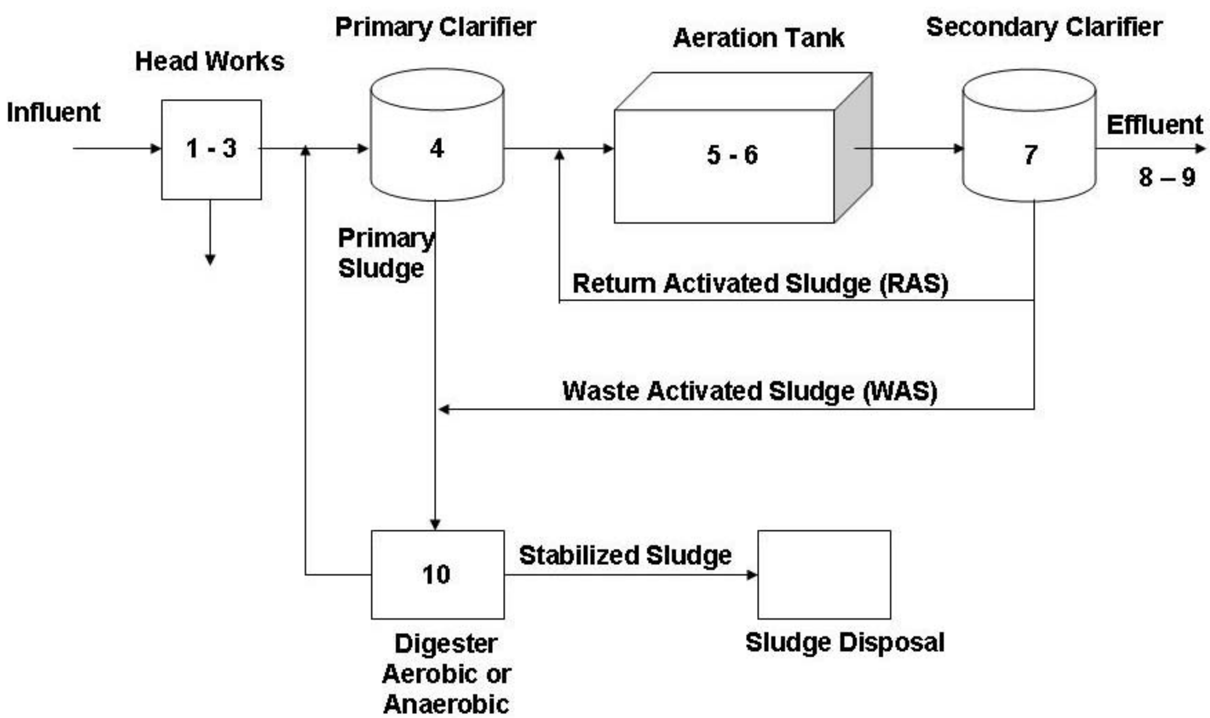
(4) Pour a small amount of 1:1 nitric acid into one jar, and securely place the proper Teflon cap on the jar. Swirl the nitric acid throughout the jar, remove the lid, and pour the nitric acid into the next jar. Repeat this procedure until all the bottles have been treated. Rinse bottles with water after the acid wash. **NOTE:** ***Wear safety glasses or a full-face shield to protect your eyes.***

(5) Place the jars in the drying oven. If the jars are to air dry, use Acetone to clean the bottles the same way as stated in (4) above. Let the jars and caps dry completely.

(6) Place the jars, with their caps on loosely, in their respective places in the sampling van.

Selection of Sampling Site

In order to ensure the collection of valid samples, a representative sampling site must be selected. For industrial sampling, the sites are designated in the permit.



Industrial Users - Permitted/Nonpermitted *(Example Procedure)*

The sampling points within an industry vary with each industry, depending on the nature of the process and location of pretreatment facilities. Therefore, exact locations must be identified on a case by case basis. However, the following general principles apply in all cases:

(1) A permanent sampling location(s) must be identified for use by the POTW and the IU.

All permitted industries are required to install a sampling vault. The location of the vault is designated by the enforcement inspector. The enforcement inspector responsible for an individual company or site is responsible for providing directions (maps) to the specific sampling points, as well as current copies of permits and the name of the contact person and phone number. This information needs to be kept current in the sampling file.

Locations of sampling points need to be compared to what is listed on the current permit. If sampling points that the POTW is using do not agree with permit location, do not sample and refer to Chief Inspector or Supervisor.

(2) The sampling location should be easily accessible and relatively free of safety hazards.

(3) For categorical industries, there should be, if possible, no discharge present other than that from the regulated process. If other wastestreams are combined with the regulated wastestream prior to the sampling location, the combined wastestream formula will need to be utilized. The sampling crew must be aware of lower limits to correctly show analysis on chain of custody.

(4) If the rate of industrial process discharge flow is needed (i.e., where mass limitations are applied), the sampling location will need to be located where the flow of the wastestream is known or can be measured or estimated and flow rates for the other wastestreams obtained.

(5) In instances where sampling must be performed in the sewer outside of the building, the IU must install a sampling vault in accordance with Code.

Sample Type and Analyses

Typical sample volumes are required for various analyses. In addition, the laboratory has developed standard volumes for routine analyses performed on industrial waste samples as follows:

(1) BOD/COD/TSS (1000-2000 ml, plastic)
(2) Heavy metals (500-2000 ml, plastic)
(3) Cyanide (2000 ml, plastic)
(4) Oil and grease (1000 ml, level-one glass)

Selection and Preparation of Sample Containers

The selection of a sample container is based on the parameter to be measured. The inspector should be familiar with the type of sampling containers and preservatives that are needed.

It is essential that the sample containers be made of chemically resistant material, and do not affect the concentrations of the pollutants to be measured. In addition, sample containers should have a closure (i.e., leak proof/resistant, Teflon lined) that protects the sample from contamination and should be properly labeled before leaving the sampling site.

Sample Preservation
Wastewater usually contains one or more unstable pollutants that require immediate analysis or preservation until an analysis can be made. Sample preservation is needed for composite samples, for example, which may be stored for as long as 24 hours prior to transferring them to the laboratory. Recommended preservatives and holding times that should be used for specific pollutants are presented in the front of this Chapter.

Chain of Custody
Documentation of all pertinent data concerning the collection, preservation and transportation of samples is critical to the overall success of the Wastewater Sampling Program. If sampling is performed for the Pretreatment program, any sampling data may be used as evidence in court proceedings against a noncompliant industrial user. In this case, documentation becomes critical. This form is a legal document and is of major importance in a court hearing.

Specific procedures with regard to chain of custody are outlined below:

(1) The sampling crew takes a sufficient supply of prenumbered Industrial Waste Lab Reports, (custody forms) and sample containers into the field. This form is shown in Exhibit 8-6.

(2) The sampling crew fills in the sampling form at the time of sample collection, and returns the form to the lab along with the collected sample. Specific information to be completed on the form includes:

(a) CODE: The company ID number assigned by supervisor.

(b) SITE No.: The sampling point ID number assigned by supervisor.

(c) DATE SAMPLED: From - Date sampling began To - Date sample is pulled. If it is a grab sample, only the date the sample was taken will be entered with the other line crossed out.

(d) SUBMITTED BY: This will have a preprinted truck number. The sampling crew will write in their initials on the blank line which follows.

(e) LABEL: A letter is checked and the type of analysis to be performed. .

(f) PRESERVATIVE: The method of preservation used. See Table 8-5 to see which preservatives to use.

(g) TYPE SAMPLE: Check off whether flow proportional, timed composite, hand composite, or grab sample.

(h) TIME: The time frame needed for collection of the sample. A starting time for sample collection, an ending time, and a total time in hours and quarter hours is recorded, such as 23.25 hours. On a grab sample only, the end time, which is the time the sample was taken, will be entered and the other two lines will be crossed out.

(i) RELINQUISHED BY: This is the signature of person that relinquishes sample to lab personnel, or to any other person taking custody of the sample.

(j) DATE: Date sample is submitted to the laboratory or relinquished to another person.

(k) NOTES TO LAB: Includes any special notes to the lab, such as special analysis required of the sample, a letter code which is assigned to the entity being tested, the amount of flow if sample is flow proportional, grab sample pH and temperature, and/or actual sample temperature.

(l) FIELD TEST: Results of any field tests including sample pH, hexavalent chromium, dissolved sulfides, copper, and residual chlorine. See Table 8-5 to see which field tests need to be performed on the sample.

(m) RESULTS: The appropriate box(es) need to be checked to correspond to the label designation chosen above.

(3) When the sampling is completed at a site, the sampling crew labels the bottles with the label letter designation. The samples are sealed with chain of custody seals and placed in an ice chest for transportation to the lab.

(4) The sampling crew submits the samples and the chain of custody form to the laboratory.

(5) The laboratory logs the samples and assigns a Lab Reference Number to the sample. The sample is tracked by this number.

(6) Laboratory personnel sign and date the form, and return it to the sampling crew who makes two copies of the form. One copy is for the sampling crew files and the other is for data entry. The original form is returned to the laboratory. It is also important to note that the sampling vehicle should be kept locked at all times when the sampling crew is not in the vehicle, or in full view of the vehicle.

Quality Assurance/Quality Control (*example*)

Quality Assurance/Quality Control **(QA/QC)** measures taken by the sampling crew include equipment blanks, trip blanks, split samples and duplicate samples. Equipment blanks and trip blanks are routine QA/QC measures.

Split samples are taken for Local Limits sampling and when requested by an industry. Split samples requested by an industry are analyzed by their lab at their expense. Duplicate samples are run when requested by a Project Leader.

The laboratory prepares all trip blanks/travel blanks used by the sampling crews. This is performed in the laboratory rather than in the field in order to assure that there is no field contamination in the blanks.

Any contamination detected in the blanks would result from field exposure which could in turn affect collected samples.

An operator shows a group of Cub Scouts the quality of final effluent. A Pretreatment Inspector's work is reflected by the wastewater treatment system and the collection's system lack of problems. Most Wastewater Operators do not realize the benefits of having Pretreatment Inspectors protecting wastewater from illegal industrial and commercial discharges.

QA/QC Field Procedures for Plant Sampling *(Example)*

Duplicate Sampling Procedure

The purpose of Duplicate Samples is to check the laboratory's ability to reproduce analytical results. Duplicate Samples are to be collected using these steps:

1. Determine amount of sample needed. If a flow proportion sample is required, then base the amount of sample needed on the current flow reading. If a flow-proportion sample is not required, then use the predetermined amount for the sampling site.
2. Collect sample using a grab type sampler or a sampling head.
3. Measure the amount determined in Step 1 using a graduated cylinder or other accurate measuring device.
4. Pour measured sample into sample container that is not marked as the Duplicate Sample.
5. Measure same amount as in Step 1.
6. Pour second measured quantity into sample container marked for Duplicate Sample.
7. Process both samples using standard procedures and submit both samples to laboratory.

Split Sampling Procedure

The purpose of Split Samples is to check analytical procedures by having the samples analyzed by two different laboratories. Split Samples are to be collected using these steps:

1. Determine amount of sample needed. If a flow proportion sample is required, then base the amount of sample needed on the current flow reading. If a flow-proportion sample is not required, then use the predetermined amount for the sampling site.
2. Collect sample using a grab type sampler or a sampling head.
3. Measure the amount determined in Step 1 using a graduated cylinder or other accurate measuring device.
4. Pour measured sample into sample container that is not marked as the Split Sample.
5. Measure same amount as in Step 1.
6. Pour second measured quantity into sample container marked for Split Sample.
7. Process both samples using standard procedures and submit both samples to the laboratory. The laboratory will be responsible for submitting the samples to the outside laboratory that will be analyzing the Split Sample.

Trip Blank Procedure

The purpose of Trip Blanks is to determine if the sample bottles have been adequately cleaned, and if sample contamination occurs between the time sample bottles leave the laboratory to the time that samples are returned to the lab.

Trip blanks are prepared by the laboratory using bottles supplied by the sampler. They are picked up by the person who begins the sampling day. Trip blanks are placed in the cooler which contains the other samples, and remain there until the samples are turned into the laboratory.

Field Equipment Blank Procedure *(Example)*

The purpose of Field Equipment Blanks is to test the procedure for cleaning the sample measuring container to determine if cross contamination between sample sites has occurred. These Blanks are needed only at sites where flow-proportion samples are taken. Follow these steps when collecting a Field Equipment Blank:

1. Collect Field Equipment Blank **AFTER** collecting a sample and **BEFORE** moving to the next sampling location.
2. After collecting a sample, triple rinse the sample measuring container, usually a graduated cylinder, using High Purity water.
3. Open a sealed bottle of High Purity Water.
4. Pour the High Purity Water into the sample measuring container that was just rinsed.
5. Pour the High Purity water from sample measuring device into sample bottles labeled for the Field Equipment Blanks.
6. Repeat Steps 3 through 5 until all Field Equipment Blank sample bottles have been filled.
7. Process samples using standard procedures and submit to laboratory.

An equipment blank is high purity water which has been collected in a composite sample bottle or a series of discrete bottles from an automatic sampler. Equipment blanks are used to evaluate the reliability of composite samples collected in the field. The data produced from the equipment blank indicates the performance of the sample collection system, which involves the cleaning of sampling equipment, and accessories, preservation techniques, and handling of samples. The objective is to demonstrate that the samples are not contaminated by inadequate cleaning of equipment, contaminated preservation additives or sample collection techniques, and to provide documented records on Quality Assurance Practices.

Procedures to be followed in collecting the equipment blanks are outlined below. (Also see QA/QC check list, example).

(1) The sampler is to be assembled completely in the manner determined by the parameters the crew will be sampling (i.e. if sampling for organics, Teflon suction tubing must be used at that site). The composite jar inside the sampler must always be rinsed out thoroughly with high purity water.

(2) Program the sampler to collect the proper amount of high purity water that is representative of the sample parameters that will be collected at that site. Grab samples are excluded. Pump high purity water through the strainer and intake tubing prior to filling the sampler bottle. Then, place the strainer into as many fresh, uncontaminated bottles of high purity water as needed to collect the necessary volume of sample.

(3) If the sampler is set up in the discrete mode, the crew must then transfer the collected samples into the field composite bottle and shake to mix thoroughly.

(4) Transfer the sample from the field composite bottle into its respective lab sample bottles. Test and preserve the samples as appropriate for the parameters being analyzed.

(5) Follow the chain of custody procedures outlined in SOP for turning the samples in to the laboratory. All paperwork must be completed at this time,

and all bottles must be marked accordingly. Custody seals must be used. The crew must note the sampling activity in a logbook that is kept specifically for documenting preparation of equipment blanks and/or any other QA activities.

Sampling Techniques *(Example)*

General Guidelines
In general, the following guidelines should be observed in conducting sampling activities:

(1) Samples being collected must be representative of the wastestream being tested.

(2) Samples shall be collected in uncontaminated containers and preserved properly.

(3) Samples should be of sufficient volume for the required analyses.

(4) Samples should be stored in a manner which does not alter the properties of the sample prior to chain of custody transfer.

(5) Samples should be properly and completely identified by marking them with the proper information.

(6) Sample lines should be as short as possible and the smallest practical diameter to facilitate purging, reduce lag time, and give adequate consideration to maximum transport velocity. Also, they should have sufficient strength to prevent structural failure.

(7) Sample lines should be pitched downward at least 10 percent to prevent settling or separation of solids contained by the sample.

(8) Samples should be delivered as quickly as possible to the laboratory.

Specific Techniques
Sampling techniques in addition to the above general guidelines must also recognize differences in sampling methodology, preservation, and analytical methods.

The following sections specify techniques that differ by pollutant group and discuss such factors as sampling methodology (e.g., composite, grab, etc.), type of container, preservation and holding time.

Sampling Techniques for Volatile Organics *(Example)*
Volatile organics are analyzed in accordance with EPA methods 601, 602, and 603.

Due to the volatility of these compounds, only grab samples can be taken. If a composite sample is needed, individual grab samples must be collected and composited in the laboratory prior to analysis.

The procedures that must be followed in taking these samples are outlined below.

NOTE: Gloves, clothing, face, and eye protection must be worn when handling volatile organics. In addition, the sampling crew must thoroughly clean those parts of the body that have been exposed to these materials.

(1) For each sampling date, the lab will also provide two additional bottles to be used as a backup in case of breakage. These sampling vials are only good for one week. If any are unused, they must be returned to the lab for disposal.

(2) The lab will provide one sample trip blank per sampling date. This bottle is to be kept on ice until the samples are submitted to the lab. At least one day prior to sampling, go to the lab and request the sample bottles (40 ml vials) for the specific sampling site, as indicated by the sampling plan. The laboratory will arrange to have the appropriate number of sample bottles prepared, based on the number of analyses to be performed. The sampling crew should make sure that all bottles are provided for these samples by the lab technicians.

(3) Collect the sample in a clean glass beaker. Test for chlorine with the Hach test kit. If there is any chlorine residual, neutralize the chlorine with sodium thiosulfate ($Na_2S_2O_3$) and retest for chlorine. Repeat until there is no chlorine residual. Make notes on chain of custody sheet if extra amounts of sodium thiosulfate are required for neutralization.

(4) Remove the vials from the ice. There will be two empty vials for the 601 sample and two vials with HCl for the 602. The HCl will already have been measured into the vials by the lab personnel.

(5) Fill the vial to just overflowing in such a manner that no air bubbles pass through the sample as the vial is being filled. This is accomplished by pouring the sample from the beaker into the vial along the side of the vial to minimize the possibility of entrapping air in the sample. Do not rinse out or overfill the vials, this will wash out the preservative in the vial.

(6) Seal the vial so that no air bubbles are entrapped in it. Remember to put the Teflon side of the cap facing down onto the vial.

(7) To be sure there are no air bubbles, turn the vial upside down and tap it against the palm of the hand. Check to see if there are air bubbles along the sides or bottom of the vial. If there are bubbles, unseal the vial, top off the vial, and reseal. Check the vial again for the presence of bubbles.

(8) All samples must be maintained at 4°C from the time of collection until the time of extraction. Custody seals must be placed on all samples, and all paper work must be filled out properly.

(9) Return the sample bottles and QA/QC bottles to the laboratory the same day the sample is collected.

Acid/Base/Neutral Extractable Organics and Pesticides

Acid extractable organics are analyzed in accordance with EPA methods 604 and 625. Base/neutral extractable organics are analyzed in accordance with EPA method 625, or individual methods for various groups of compounds including EPA methods 605, 606, 607, 609, 611, and 612. Pesticides are analyzed in accordance with EPA method 608.

The procedures that must be followed in taking these samples are outlined below.

(1) Samples must be collected in certified clean one-gallon amber glass bottles with Teflon lids.

(2) No travel blanks or QA/QC bottles are required with the samples.

(3) Grab samples must be collected in amber glass bottles. They do not have to be completely filled, but must be a minimum of 1/3 to 1/2 full. Bottles should not be prewashed with samples prior to filling.

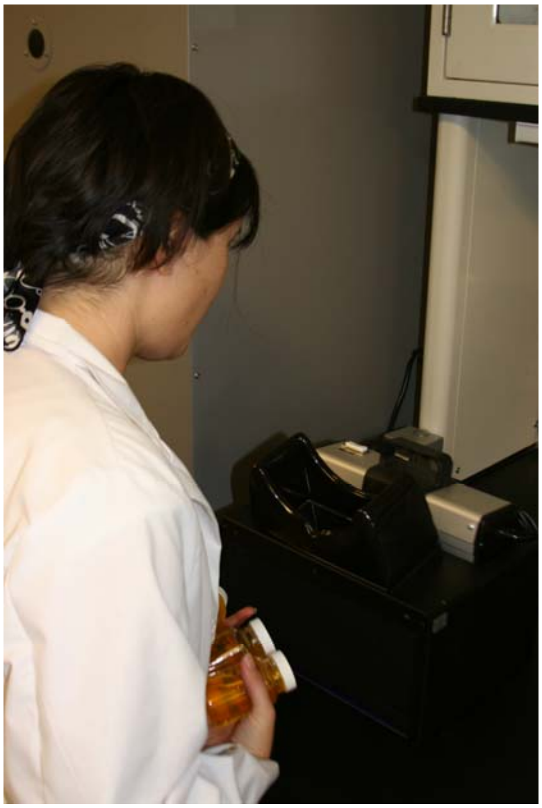
(4) For composite sampling, glass composite bottles must be used and precleaned. Teflon tubing must be used for the suction piping. The pump tubing must be medium grade silicone rubber.

(5) The composite bottle in the sampler must be kept refrigerated (putting ice in the sampler) at 4°C. If amber glass is not used (i.e. 2 1/2-gallon clear composite sampler bottle), the sample must be protected from the light during collection and compositing. The compositing must be done in the field (i.e. when discrete sampling has been used).

(6) All samples must be iced at 4°C from the time of collection until extraction.

(7) The sample should be checked for the presence of chlorine using field test kits that provide results in accordance with EPA methods 330.4 and 330.5. If chlorine is determined to be present, 80 mg of sodium thiosulfate should be added to each bottle. The sample must be retested for chlorine. This procedure must be repeated until there is no residual of chlorine shown. The amount of sodium thiosulfate added must be noted on the chain of custody if in excess of 80 mg.

(8) All necessary paperwork must be completed at sampling site. All bottles must be properly labeled, and have custody seals.



Sampling Techniques for Heavy Metals ***(Example)***

(1) Generally, all metal samples collected are to be composite samples, i.e., flow/composite, time/composite, or hand composite.

(2) For composite sampling, place the lid on the bottle and agitate the bottle to completely mix the composite sample.

(3) Transfer the required amount from the composite container to either a 500 ml or 2000 ml clean plastic bottle. Check the pH of the sample as described in Section 8.7.2.5.

Note: For inductively coupled plasma (ICP) metal analysis, a 500 ml clean plastic bottle is required. For extra metals or metals by furnace, a 2000 ml clean plastic bottle is required.

(4) Add nitric acid (1:1 solution) to the sample to reduce the pH to below 2.0. Usually, 2 ml/500 ml is sufficient. Recheck the pH to be sure it is below 2.0. Make a note on the lab sheet if more than two ml of acid is required to bring the pH below 2.0.

(5) Label the sample bottle with the corresponding IW number and proper analysis code letter. Attach the custody seal to the sample, then store in the ice chest until transferred to the laboratory. Fill out the IW lab sheet with all the pertinent information, being careful to include all required parameters and the type of analysis required, e.g., ICP/furnace.

(6) When a grab sample is necessary, rinse out the receiving sample bottle with an aliquot of the sample stream at least three times. Then fill the sample bottle and proceed with steps two through four described above.

(7) When a split sample is requested (i.e., one for the samplers and one for the user), the composite sample is prepared as described in item one. Providing there is sufficient sample, a portion is transferred into the bottle provided by the user.

(8) If more than one site is sampled per day, a clean composite container (i.e., two and one half-gallon glass jar), must be used at each site.

(9) If a discrete sampler is being used, at the time of collection combine all the samples that have been collected into a single clean composite bottle. Then follow the preceding steps one through four, and refer to step six if a split is requested.

Cyanide *(Example)*

To assure that the sample can be analyzed for cyanide, no chlorine can be present in the sample. Procedures for taking cyanide samples are as follows:

(1) This sample is normally a grab sample. The cyanide sample is a composite sample when collected as part of Priority Pollutants or Plant Sampling at the waste treatment plants.

(a) In the sampling file, check the industries' wastewater discharge permit and locate all cyanide (**CN**) sampling sites. If the sampling sites are located in a confined space, follow Confined Space procedures before collecting the sample or samples.

(b) Collect 2000 ml (maximum), 1000 ml (minimum), of CN sample into a type C plastic bottle.

NOTE: 2000 ml is the standard, but for batch dischargers 1000 ml is adequate.

(c) Test the cyanide sample for pH and temperature with the pH meter. Record the results on the custody sheet (Industrial Waste (IW) lab sheet).

(d) Test for chlorine with a **Hach Total Chlorine Test Kit** (the instructions ate located in the kit)

(e) If chlorine is present in the CN sample, neutralize it with Ascorbic Acid ($C_6H_8O_6$). For ascorbic acid neutralization, add $C_6H_8O_6$, a few crystals at a time, until five mls of sample in the test tube produces no color. Then add an additional 0.06 g of $C_6H_8O_6$ for each liter of sample volume.

(f) Once all Cl_2 has been neutralized, preserve the sample with Sodium Hydroxide (NaOH) and raise the pH to >12. Verify the >12 pH with a pH meter or pH test strips.

(g) Mark on the side of the CN sample bottle the IW Lab sheet number (using a water proof marker), and place a corresponding custody seal across the sample bottle tightened cap. Place a Cyanide label on the bottle if cyanide is suspected of being present in the sample.

(h) Store the CN sample in the ice at 4°C and transport it to the laboratory.

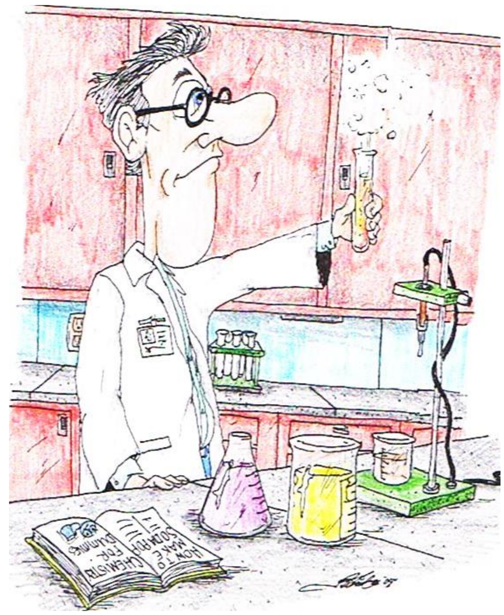
Total Sulfides *(Example)*

(1) The Total Sulfide sample is collected as a grab sample only. Use a clean 500 ml plastic bottle to collect the sample. This sample may be pumped into the sample container or collected directly from the discharge side of the sampling device.

(2) Preserve the sample with 1 ml of 2N Zinc Acetate ($C_4H_6O_4Zn$) and then add Sodium Hydroxide (NaOH) to raise the pH > 9.

(3) Label and seal the sample with a custody seal. Cool to 4°C.

Oil and Grease/TPH *(Example)*



EPA Method 1664A

Extraction of Oil and Grease from Water Samples Using Solid-Phase Extraction (SPE) Disk Configuration

Oil and Grease Disc Configuration Method

Acidify each 1L sample to pH < 2 using 6 M of HCl.

Place required number of samples (1–6) in the sample vial rack. Insert sample lines into each sample bottle.

Collection

Label the collection vials (1–6) and place these into the collection rack. Position the solvent bottles on the left side of the Dionex AutoTrace instrument.

Solvents

Add methanol to solvent bottle

1. Water (pH 2) to solvent bottle
2. Hexane/THF (1:1) to solvent bottle
3. Hexane to solvent bottle
4. And water to solvent bottle
5. Place these solvent bottles to the left side of the Dionex AutoTrace instrument and insert the solvent lines into the corresponding bottle (up to five different solvents can be used with the Dionex AutoTrace instrument). SPE Media Insert SPE disks onto the Dionex AutoTrace instrument (see Dionex (now part of Thermo Scientific) AutoTrace 280 Operation Manual for details1) and secure the disk into place using the disk holder. The green LED will be illuminated when the disk is locking into place.

METHOD 413.1 (Oil and Grease). Is no longer a valid procedure.

BOD/COD/SS *(Example)*

(1) 24-hour composite sampling is always used for this test. Agitate the bottle to completely mix the composite sample. Do not allow the solids to settle out before you pour off the sample.

(2) When more than one sample is being taken from a composite bottle, the BOD/COD/SS is taken first. The lab needs 1000 ml if the sample is cloudy or has solids. If the sample is clear, you must collect 2000 ml. Transfer the appropriate volume to the sample bottle.

(3) Take the pH/temperature of the sample with either pH paper and a thermometer, or the pH meter carried on the sampling trucks.

(4) Label the sample bottle and place a custody seal over the lid. Store on ice at 4°C.

(5) Should split samples be requested, they are given when it is sure there is enough sample for POTW's requirements. Users must provide their own sample containers and allow POTW's staff to pour off samples.

Virus Sampling *(Example)*

Viruses are microbiological organisms which can cause infectious diseases. Wastewater recharge and sewage disposal into the environment may contribute to the occurrence of viruses in surface water and groundwater. Viruses are the most mobile and infectious of the waterborne pathogens. Large volumes of water must be filtered to detect viruses. This involves passing the water samples through a cartridge filter by use of a gasoline driven pump.

(1) **Equipment Needed**

Most of the equipment required for virus sampling is available on the sampling trucks. However, some equipment is virus sampling specific. The needed equipment is as follows:

(a) Gasoline/oil powered water pump
(b) Hoses - intake (supplied with pump) and discharge (garden type, with female connectors at both ends)
(c) Two 55-gallon plastic containers
(d) Filter apparatus
(e) Cartridge filters
(f) Sodium thiosulfate (two 500 gram bottles/site)
(g) Gasoline can with gas/oil mixture
(h) Hach total chlorine test kit
(i) Large plastic Zip-lock bags (supplied with cartridges)
(j) Chain of custody sheets
(k) Thermometer
(l) Water-proof marker
(m) Latex gloves
(n) Liquid bleach
(o) Cooler with blue ice
(p) pH meter

(2) **Sampling Procedure**

Check the pump for gas/oil prior to starting **(do not fill while it is running).** Make sure the gas/oil mixture is correct by checking the mixing instructions on the side of the two-cycle pump oil can. Latex gloves should be worn for protection, and to prevent contamination of the filters.

Connect the hoses and filter housing (with no filter) to the pump, and run the effluent through it for one to two minutes to flush the system. Next, pump effluent into the two 55-gallon drums and rinse them out. (Note: If disinfection was not possible after the last sampling, then 50-100 gallons of effluent should be pumped through the entire equipment set up prior to placing the filter in the housing.)

Pump effluent almost to the top (just above the handles) of both containers. While the drums are filling, check the water in the drums for chlorine using a Hach test kit and record the results and the temperature on the custody sheet. If chlorine is present and needs to be eliminated, add 500 grams of sodium thiosulfate to each container to eliminate it. After visual observation has determined that all the sodium thiosulfate has dissolved, retest to make sure there is a <0.1 ppm chlorine residual. If chlorine was removed, take the hose from the channel, allow it to drain, and reprime the pump with the dechlorinated water.

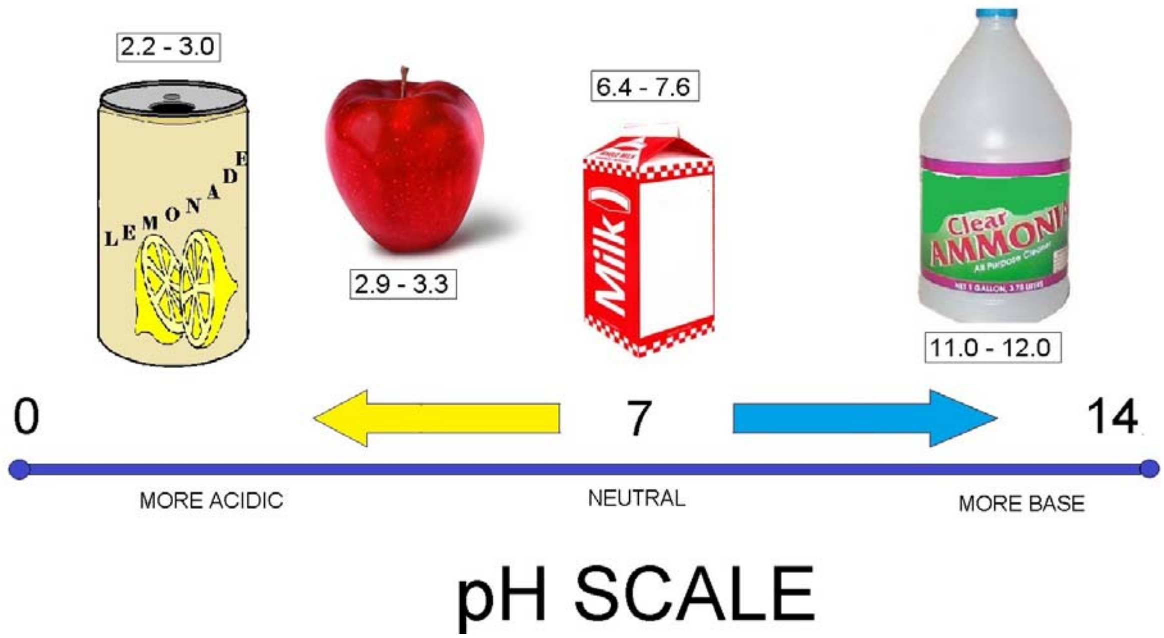
Pump this water through the system to flush it, and adjust the flow to fill a one-gallon jug in about 15-20 seconds. Don't waste too much water, as the flow can be adjusted after the filter is inserted. Install the filter into the blue holder, being very careful not to touch it with your hands (wear clean latex gloves). There are two black washers that go with the filter, one on the bottom and the other on the top. Make sure these are aligned with the filter housing to prevent leaking. Screw the holder and filter onto the apparatus.

Refuel the pump, restart it, and adjust the water flow so that it is close to 15-20 seconds per gallon. Make sure the housing doesn't leak. Try to keep this amount of flow, since too great a flow will cause pass-through in the filter. Pump the water from both containers until they are empty. Stop the pump, remove the filter (wear clean latex gloves), and place it in its original zip-lock bag. The washers do not need to go with the filter, but if they fall into the bag it is better to leave them than take the chance of contaminating the filter trying to remove them. Fill in the information area on the zip-lock bag with a marker, indicating the plant being sampled and the date, and put it in the cooler with the blue ice provided. The blue ice keeps the temperature at 4°C to prevent significant die-off of the viruses.

While at the site, or later at the plant, mix a half-gallon of bleach to 10 gallons of clean water. Pump it through the flow system and the containers. Rinse everything with fresh water and drain it so it is ready for the next time. Let the pump cool before storing it. Store the gas/oil mixture in the warehouse flammable storage cabinet.

Parasitology Sampling
Parasitology sampling utilizes the same equipment and techniques as in the virus sampling described above. However, a different type of filter, which is provided by the Lab, is used.

The pH Scale



pH: A measure of the acidity of water. The pH scale runs from 0 to 14 with 7 being the mid point or neutral. A pH of less than 7 is on the acid side of the scale with 0 as the point of greatest acid activity. A pH of more than 7 is on the basic (alkaline) side of the scale with 14 as the point of greatest basic activity.

pH = (**Power of Hydroxyl Ion Activity**).

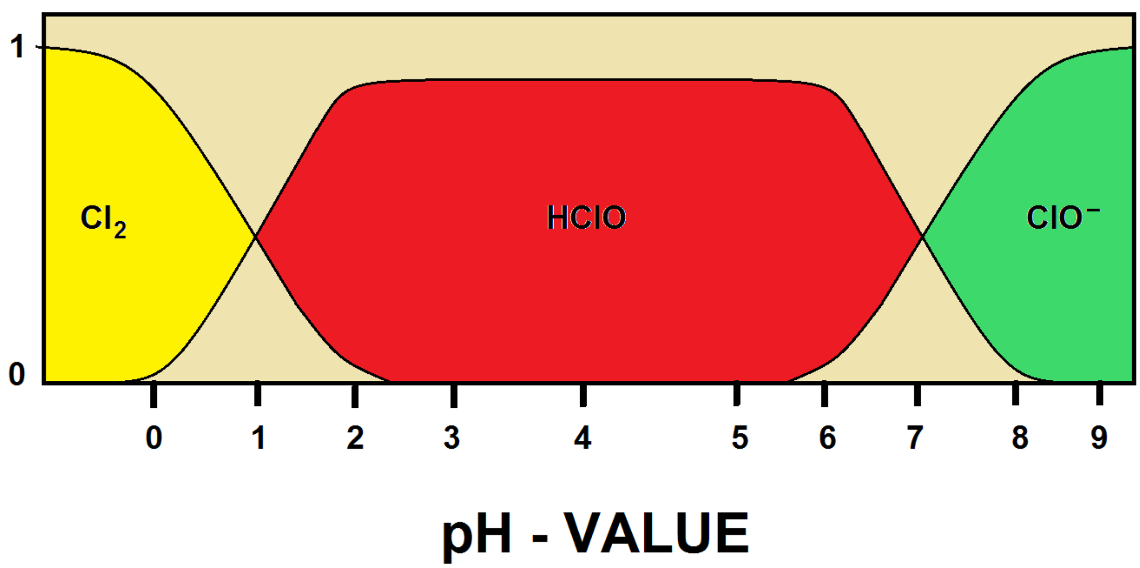
The acidity of a water sample is measured on a pH scale. This scale ranges from **0** (maximum acidity) to **14** (maximum alkalinity). The middle of the scale, **7**, represents the neutral point. The acidity increases from neutral toward **0**.

Because the scale is logarithmic, a difference of one pH unit represents a tenfold change. For example, the acidity of a sample with a pH of **5** is ten times greater than that of a sample with a pH of **6**. A difference of 2 units, from **6** to **4**, would mean that the acidity is one hundred times greater, and so on.

Normal rain has a pH of **5.6** – slightly acidic because of the carbon dioxide picked up in the earth's atmosphere by the rain.

CONCENTRATION OF HYDROGEN IONS COMPARED TO DISTILLED H2O	pH	EXAMPLES OF SOLUTIONS AND THEIR RESPECTIVE pH
1/10,000,000	14	LIQUID DRAIN CLEANER CAUSTIC SODA
1/1,000,000	13	BLEACHES OVEN CLEANERS
1/100,000	12	SOAPY WATER
1/10,000	11	HOUSEHOLD AMMONIA (11.9)
1/1,000	10	MILK OF MAGNESIUM (10.5)
1/100	9	TOOTHPASTE (9.9)
1/10	8	BAKING SODA (8.4) / SEA WATER EGGS
0	7	"PURE" WATER (7)
10	6	URINE (6) / MILK (6.6)
100	5	ACID RAIN (5.6) BLACK COFFEE (5)
1000	4	TOMATO JUICE (4.1)
10,000	3	GRAPEFRUIT & ORANGE JUICE SOFT DRINK
100,000	2	LEMON JUICE (2.3) VINEGAR (2.9)
1,000,000	1	HYDROCHLORIC ACID SECRETED FROM STOMACH LINING (1)
10,000,000	0	BATTERY ACID

pH Scale



Field Tests

pH meter calibration examples, you should have a similar policy located with your pH meters.

There are several different pH meters on the market. For this course, two types of pH meters will be discussed--the 230A and the 250A models. A two-buffer calibration is used, 7 pH and 10 pH, since most of the tested samples fall within these ranges. Following are the methods presently used in the calibration and measuring techniques of these meters:

(1) Calibration of the Orion 230A Model pH Meter

(a) Two-buffer calibration is used. The first calibration buffer liquid (pH 7) is near the electrode isopotential point, and the second (pH 10) is near the expected sample pH. Choose buffers that are no more than three pH units apart. Use fresh buffers at the beginning of each week.

This calibration should be done at the beginning of each day and the results entered in the pH logbook.

(b) Uncover the fill hole. This should always be uncovered when using the meter and checked to make sure it is full of electrolyte solution. Turn on the meter's power. Rinse the electrode with high purity water then place it in the pH 7 buffer.

(c) Press "**cal**". CALIBRATE and P1 will be displayed.

(d) Wait for the meter to display **READY** with the pH reading flashing. If this is the correct pH, enter "yes" and proceed to step "E". If not, press the "**timer**" key and the first digit will start flashing. Pressing the "timer" or "setup" key ("timer" for raising the number or "setup" for decreasing it), correct the digit. When it is correct, press "yes." The second digit will start flashing. Repeat the previous steps for the second and third digits.

(e) The display will now show P2, indicating the meter is ready for the second buffer. Rinse the electrode with high purity water and place it in the second buffer (pH 10). Wait for the meter to display READY with the pH reading flashing. Use the above procedure for calibrating at this pH.

(f) The electrode slope, in percent, will be displayed (this value must be between 92 to 102 percent) along with the temperature. Record these figures in the logbook.

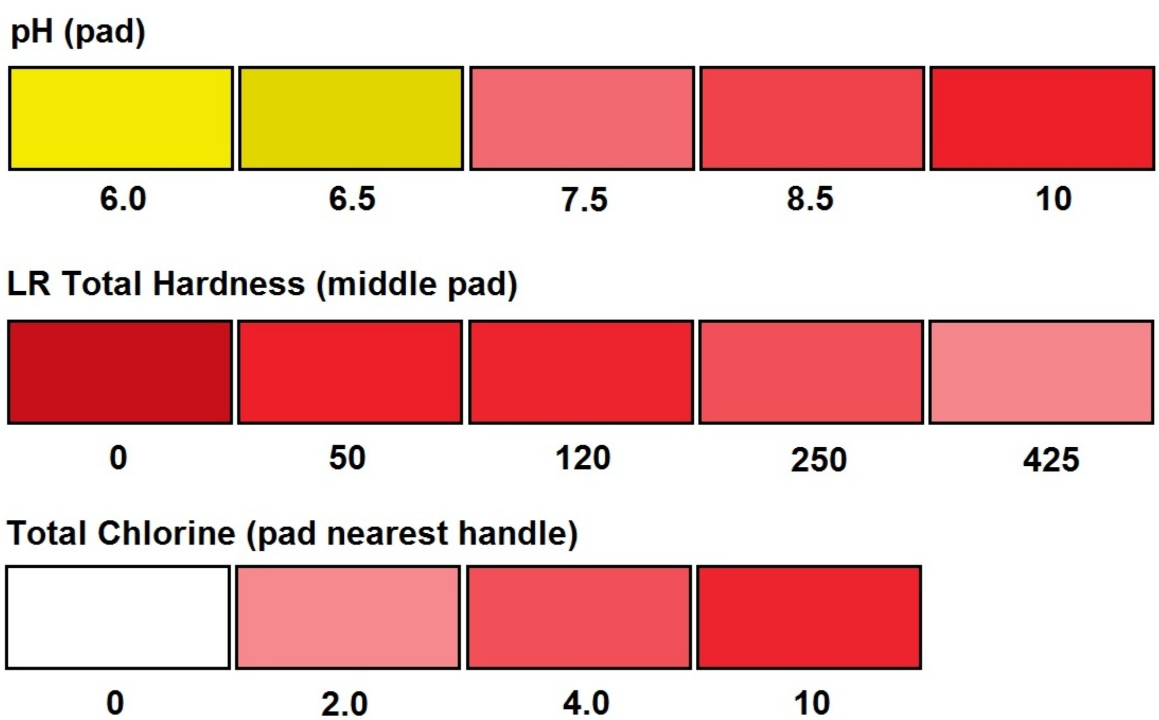
(g) Rinse the electrode with high purity water and return it to the storage solution. Turn off the power. When the electrode won't be used for awhile, cover the fill hole with the rubber sleeve.

(2) Calibration of the Orion 250A Model pH Meter

(a) This procedure is the same as the 230A Model through steps (a) and (b) above.
(b) Press the "mode" key until the pH mode indicator is displayed. Place the electrode in the first buffer and press the "2nd" key. P1 will be displayed.
(c) Go to step (d) in the calibration of the Orion 230A model and continue with the same set up.

(3) Measuring Techniques for pH with Orion Models 230A and 250A

(a) Making sure the fill hole is uncovered, turn on the meter's power. Rinse the electrode with high purity water.
(b) Place the electrode in the sample.
(c) When the display is stable and shows READY, record the sample pH and temperature.
(d) Rinse the electrode, return to the storage solution, and turn the power off. When finished for the day, cover the fill hole.



pH / CHLORINE / HARDNESS TEST STRIP

Sampling Procedures for Hexavalent Chromium (Hach Kit) *(Example)*

(1) Rinse out the two color viewing tubes with a portion of the sample to be tested.

(2) Refill one of the color viewing tubes to the 5 ml mark with a sample (this is the test sample). Using the clippers provided in the test kit, open one ChromaVer three chromium reagent powder pillow. Add the contents of the pillow to the sample. Stopper and shake to mix and put the tube in the color comparator.

(3) Fill the other viewing tube with a sample and put it in the left side of the color comparator (this is the blank).

(4) Let the viewing tubes sit in the color comparator for approximately 5 minutes. The samples should not be exposed to direct sunlight.

(5) Hold the color comparator up to a light source and view the two samples through the two openings in the front. Rotate the dial on the holder until the color appears the same in both samples. Record the results from the dial (which is read in mg/l Cr +6) onto the chain of custody form.

Sampling Techniques for Dissolved Sulfides (Chemetrics, Inc. Kit) *(Example)*

(1) Collect a 25 ml grab sample in the container provided.

(2) Add three drops of activator (amber colored liquid) and mix well.

(3) Break a sulfide chemet Type S glass ampule and add the contents to the 25 ml container.

(4) Let stand five minutes.

(5) Take a reading and record the results on the chain of custody form. If the reading is 0.0 then show the results less than 0.1 mg/l.

Sampling Techniques for Free and Total Chlorine (Hach Kit) *(Example)*

Procedures for determining free chlorine are as follows.

(1) Rinse out the two color viewing tubes with a portion of the sample to be tested.

(2) Refill one of the color viewing tubes to the 5 ml mark with a sample (this is the test sample). Using the clippers provided in the test kit, open one DPD free chlorine reagent powder pillow. Add the contents of the pillow to the sample. Stopper and shake to mix and put the tube in the color comparator. All of the powder does not have to dissolve to obtain correct readings.

(3) Fill the other viewing tube with the original sample and put it in the left side of the color comparator (this is the blank).

(4) Let the viewing tubes sit in the color comparator for approximately 1 minute. The samples should not be exposed to direct sunlight.

(5) Hold the color comparator up to a light source and view the two samples through the two openings in the front. Rotate the dial on the holder until the color appears the same in both samples. Record the results from the dial (which is read in mg/l free chlorine) onto the chain of custody form.

Procedures for determining total chlorine are as follows.

(1) Rinse out the two color viewing tubes with a portion of the sample to be tested.

(2) Refill one of the color viewing tubes to the 5 ml mark with a sample (this is the test sample). Using the clippers provided in the test kit, open one DPD total chlorine reagent powder pillow. Add the contents of the pillow to the sample. Stopper and shake to mix and put the tube in the color comparator. All of the powder does not have to dissolve to obtain correct readings.

(3) Fill the other viewing tube with a sample and put it in the left side of the color comparator (this is the blank).

(4) Let the viewing tubes sit in the color comparator for approximately 3 minutes. The samples should not be exposed to direct sunlight.

(5) Hold the color comparator up to a light source and view the two samples through the two openings in the front. Rotate the dial on the holder until the color appears the same in both samples. Record the results from the dial (which is read in mg/l total chlorine) onto the chain of custody form.

Dissolved Oxygen

Dissolved oxygen (**DO**) in water is not considered a contaminant. However, the (DO) level is important because too much or not enough dissolved oxygen can create unfavorable conditions. Generally, a lack of (DO) in natural waters creates anaerobic conditions. Anaerobic means without air. Certain bacteria thrive under these conditions and utilize the nutrients and chemicals available to exist. *Under anaerobic conditions the reaction is:*

Anaerobic:

Organics-→ intermediates + CO_2 + H_2O + energy

Where the intermediates are butyric acid, mercaptons, and hydrogen sulfide gas. At least two general forms of bacteria act in balance in a wastewater digestor. Saprophytic organisms and Methane Fermenters. The saprophytes exist on dead or decaying materials. The methane fermenters live on the volatile acids produced by these saprophytes. The methane fermenting bacteria require a pH range of 6.6 to 7.6 to be able to live and reproduce. Aerobic conditions indicate that dissolved oxygen is present. Aerobic bacteria require oxygen to live and thrive. When aerobes decompose organics in the water, the result is carbon dioxide and water.

Aerobic:

Organics + Oxygen-→ CO_2 + H_2O + energy

Dissolved Oxygen in a water sample can be detrimental to metal pipes in high concentrations because oxygen helps accelerate corrosion. Oxygen is an important component in water plant operations. Its primary vale is to oxidize iron and manganese into forms that will precipitate out of the water. It also removes excess carbon dioxide. The amount of dissolved oxygen in a water sample will affect the taste of drinking water also.

Methods of Determination

There are two methods that we will be using in the lab. The membrane electrode method procedure is based on the rate of diffusion of molecular oxygen across a membrane. The other is a titrimetric procedure (Winkler Method) based on the oxidizing property of the (DO). Many factors determine the solubility of oxygen in a water sample. Temperature, atmospheric pressure, salinity, biological activity and pH all have an affect on the (DO) content.

Iodometric Test

The iodometric (titration) test is very precise and reliable for (DO) analysis of samples free from particulate matter, color and chemical interferences. Reactions take place with the addition of certain chemicals that liberate iodine equivalent to the original (DO) content. The iodine is then measured to the starch iodine endpoint. We then calculate the dissolved oxygen from how much titrate we use. Certain oxidizing agents can liberate iodine from iodides (positive interference), and some reducing agents reduce iodine to iodide (negative interferences). The alkaline Iodide-Azide reagent effectively removes interference caused by nitrates in the water sample, so a more accurate determination of (DO) can be made.

Methods of analysis are highly dependent on the source and characteristics of the sample. The membrane electrode method involves an oxygen permeable plastic membrane that serves as a diffusion barrier against impurities, Only molecular oxygen passes through the membrane and is measured by the meter. This method is excellent for field testing and continuous monitoring. Membrane electrodes provide an excellent method for (DO) analysis in polluted, highly colored turbid waters and strong waste effluents. These interferences could cause serious errors in other procedures. Prolonged usage in waters containing such gases as H_2S tends to lower cell sensitivity. Frequent changing and calibrating of the electrode will eliminate this interference.

Samples are taken in BOD bottles where agitation or contact with air is at a minimum. Either condition can cause a change in the gaseous content. Samples must be determined immediately for accurate results. The dissolved oxygen test is the one of the most important analyses in determining the quality of natural waters. The effect of oxidation wastes on streams, the suitability of water for fish and other organisms and the progress of self-purification can all be measured or estimated from the dissolved oxygen content. In aerobic sewage treatment units, the minimum objectionable odor potential, maximum treatment efficiency and stabilization of wastewater are dependent on maintenance of adequate dissolved oxygen. Frequent dissolved oxygen measurement is essential for adequate process control.

Terms:

Aerobic (AIR-O-bick) a condition in which free or dissolved oxygen is present in the aquatic environment.

Aerobic Bacteria – (aerobes) bacteria that will live and reproduce only in an environment containing oxygen. Oxygen combined chemically, such as in water molecules (H_2O), cannot be used for respiration by aerobes.

Anaerobic (AN-air O-bick)- a condition in which ***"free"*** or dissolved oxygen is not present in the aquatic environment.

Anaerobic Bacteria – (anaerobes) bacteria that thrive without the presence of oxygen.

Saprophytic bacteria – bacteria that break down complex solids to volatile acids.

Methane Fermenters – bacteria that break down the volatile acids to methane (CH_4), carbon dioxide (CO_2) and water (H_2O).

Oxidation – the addition of oxygen to an element or compound, or removal of hydrogen or an electron from an element or compound in a chemical reaction. The opposite of reduction.

Procedure for Dissolved Oxygen Determination

METER-PROBE METHOD

1. Collect a water sample in the clean 300-ml glass stoppered BOD bottle for two or three minutes to make sure there are no air bubbles trapped in the bottle. Do one Tap water sample and one DI water sample. Mark the BOD bottles.

2. Insert the DO probe from the meter into your BOD bottles. Record the DO for Tap and DI water. Now continue with the Winkler Buret method.

PROCEDURES FOR WINKLER BURET METHOD

3. Add the contents of one **MANGANESE SULFATE** powder pillow and one **ALKALINE IODIDE-AZIDE** reagent powder pillow to each of your BOD bottles (TAP and DI)

4. Immediately insert the stoppers so that no air is trapped in the bottles and invert several times to mix. A flocculent precipitate will form. It will be brownish-orange if dissolved oxygen is present or white if oxygen is absent.

5. Allow the samples to stand until the floc has settled and leaves the solution clear (about 10 minutes). Again invert the bottles several times to mix and let stand until the solution is clear.

6. Remove the stoppers and add the contents of one **SULFAMIC ACID** powder pillow to each bottle. Replace the stoppers, being careful not to trap any air bubbles in the bottles, and invert several times to mix. The floc will dissolve and leave a yellow color if dissolved oxygen is present.

7. Measure 200 ml of the prepared solution by filling a clean 250-ml graduated cylinder to the 200-ml mark. Pour the solutions into clean 250-ml Erlenmeyer flasks. Save the last 100 mls for a duplicate.

8. Titrate the prepared solutions with PAO Titrant, 0.025N, to a pale yellow color. Use a white paper under the flask.

9. Add two droppers full of Starch Indicator Solution and swirl to mix. A dark blue color will develop.

10. Continue the titration until the solution changes from dark blue to colorless (end point). Go Slow- drop by drop. Record the buret reading to the nearest 0.01mls.

11. The total number of ml of PAO Titrant used is equal to the mg/L dissolved oxygen.

Dissolved Oxygen

Meter Results

1. Deionized water ___________________________________mg/L

2. Tap water ___________________________________mg/L

3. What is the meter procedure measuring?

4. What factors would determine which is the best method to use?

5. What are two forms of bacteria present in a wastewater digestor?

Wrinkler Method Results

6. **Deionized Water**

200ml final Buret reading-
Sample initial Buret reading- -_______________ = ______________mg/L

100ml final Buret reading-
duplicate initial Buret reading- -______________dup=_____________mg/L
mls x 2

7. Tap water

200ml final Buret reading-
Sample initial Buret reading- -______________=________________mg/L
mls
100ml final Buret reading
Sample initial Buret reading- -______________=_________________mg/L
mls x 2

8. What are some factors that can alter the (DO) content prior to testing?

9. Were your samples anaerobic or aerobic?

10. Why is it important to monitor the (DO) content of water and wastewater?

Be specific and give a detailed explanation.

Sludge Volume Index (SVI)

Sludge Volume Index Lab

The Sludge Volume Index (**SVI**) of activated sludge is defined as the volume in milliliters occupied by 1g of activated sludge after settling for 30 minutes. The lower the (SVI), the better is the settling quality of the aerated mixed liquor. Likewise, high (SVI) of 100 or less is considered a good settling sludge.

Calculation:

The results obtained from the suspended matter test and settleability test on aerated mixed liquor are used to obtain the SVI.

Calculation:

SVI=

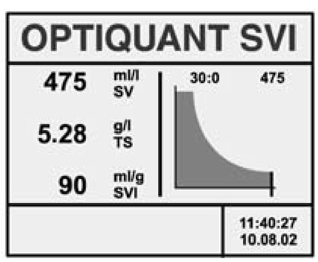
$$\frac{\text{ml/L of sludge in settled mixed liquor in 30 min} \times 1000 \text{ mg/g}}{\text{mg/L of suspended matter in mixed liquor}}$$

At last! Automated sludge volume index monitoring

Your wastewater treatment facility relies on timely monitoring of pH, flow, phosphate, ammonia, nitrate, or DO. Now, real-time assessment of sludge conditions with the new OptiQuant SVI™ Sludge Volume and Sludge Volume Index Analyzer complements these key control parameters.

Gone are manual samplings and hasty trips to the lab for analysis – it lets operators operate! No more re-mixing, dilutions, or questionable results. The SVI Analyzer's in-situ sampling yields an accurate, representative sample. It automatically detects bulking that signals upset conditions, gives operators better indication of upset root cause and corrective action, and provides on-the-spot response to chemical dosing adjustments. And the SVI Analyzer doesn't make more work for operators, because its unique sampling vessel construction discourages fouling. For complete information contact Hach at WWW.Hach.Com.

Operators select graphical or numeric SVI controller display. The controller and sampling vessel provide sludge volume monitoring, while an optional OptiQuant™ TS-line suspended solids probe allows automatic calculation of sludge volume index.



Suspended Matter for Mixed Liquor and Return Sludge

Suspended matter in mixed liquor and return sludge can be used to determine process status, estimate the quantity of biomass, and evaluate the results of process adjustments.

Apparatus

- Buchner funnel and adaptor
- Filter flask
- Filter paper 110 mm diam, Whatman 1-4
- 103^0 drying oven
- Desiccator
- Balance
- Graduated Cylinder

Procedure

1. Dry the filter papers in oven at 103˚C to remove all traces of moisture.

2. Remove papers from oven and desiccate to cool for approximately 5 minutes.

3. Weigh to the nearest 0.01g and record the mass (W_1).

4. Place the paper in the bottom of the Buchner funnel and carefully arrange so that the outer edges lay snugly along the side. Be careful not to touch it with your finger. Use a glass rod. Wet the paper, turn on the vacuum and make a good seal, make a pocket covering the bottom of the funnel.

5. Add 20 to 100 mls of sample at a sufficient rate to keep the bottom of the funnel covered, but not fast enough to overflow the pocket made by the filter paper. Record the Volume used.

6. Remove the filter paper with tweezers. Dry in a 103˚C oven for 30 minutes. Remove and desiccate. Reweigh the filter paper (W_2) to the nearest 0.01g.

Calculation:

mg/L Suspended Matter

$$\frac{(W_2) - (W_1) \times 1000 \text{ ML/L}}{\text{ML Sample}}$$

Where: (W_1) and (W_2) are expressed in mg.
(W_1) = mass of the prepared filter.
(W_2) = mass of the filter and sample after the filtration step.

Settleability Lab

The settled sludge volume of a biological suspension is useful for routine activated sludge plant control. Variations in temperature, sampling and agitation methods, diameter of settling column, and time between sampling and start of the test can significantly affect results. The same procedure and apparatus should be used each time the test is performed.

Apparatus

- Two settling columns with a minimum volume of 1000 ml
- A 1000 ml or larger graduated cylinder or Mallory settlometer may be used as a settling column.

Procedure

The settleability test on activated sludge should be run immediately after the sample is taken. The mixed liquor sample should be taken at the effluent end of the aeration tanks, while the return sludge sample should be taken at some point between the final settling tank and the point at which the sludge is mixed with primary effluent.

1. Determine the settleability of mixed liquor and return sludge by allowing 1000 mls of well mixed samples of each to settle in 1000 ml grad. cylinder or Mallory settleometer. Care should be taken to minimize floc break up during the transfer of the sample to the cylinder.

2. After 30 minutes, record the volume occupied by the sludge to the nearest 5 ml.

3. The reading at the end of 30 minutes is generally used for plant control. Although the settleability test on return sludge is not used in any of the calculations for activated sludge, the result is helpful in determining whether too much or to little sludge is being returned from the final settling tank.

Calculation: % Settled Sludge

$$\frac{\text{ml of sludge in settled mixed liquor or return sludge x 100}}{1000}$$

Sludge Volume Index Lab Report Worksheet

Suspended Matter Calculations:

(W_1) = ______mg Duplicate (W_1) = _______mg

(W_2) = ______mg (W_2) = _______mg

mls Sample = _________________ mls Sample = ________________ .

mg/L suspended matter = ________________ dup. _________________ .

Settleability Calculations:

% settled sludge = _________________________

$$\frac{\text{ml of sludge in settled mixed liquor or returned sludge} \times 100}{1000}$$

Sludge Volume Index Calculations:

$$\frac{\text{ml of sludge in settled mixed liquor in 30 minutes} \times 1000 \text{ mg/g}}{\text{mg/L of suspended matter in mixed liquor}}$$

Chapter 4 Enforcement

In addition to requirements for permitting, sampling, and inspecting IUs, the General Pretreatment Regulations also require Control Authorities to review IU reports and plans, and respond to instances of IU noncompliance in a timely, fair, and consistent manner. Enforcement of pretreatment requirements is a critical element of the Pretreatment Program, but in the past extenuating circumstances may have prevented POTWs from taking adequate enforcement.

For example, political and economic pressures from local officials could keep POTW personnel from taking appropriate actions. After this was identified as a major concern, the EPA promulgated regulations in 1990 *(55 FR 3008*2) that require all POTWs with approved pretreatment programs to adopt and implement an Enforcement Response Plan (**ERP**).

These ERP regulations, at 40 CFR §403.8(f)(5), established a framework for POTWs to formalize procedures for investigating and responding to instances of IU noncompliance. With an approved ERP in place, POTWs can enforce against IUs on a more objective basis and minimize outside pressures.

IU Compliance

To evaluate IU compliance, Control Authorities must first identify applicable requirements for each IU. In general, IU reports (discussed in Chapter 5) and POTW monitoring activities are the basis for POTW evaluation of IU compliance. Discharge permit limit exceedances, discrepancies, deficiencies, and lateness are all violations that must be resolved.

To ensure enforcement response is appropriate and the Control Authority actions are not arbitrary or capricious, the EPA strongly recommends that an Enforcement Response Guide (**ERG**) be included as part of the approved ERP. The ERG identifies responsible Control Authority officials, general time frame for actions, expected IU responses, and potential escalated actions based on:

- The nature of the violation
- Pretreatment standards
- Reporting (late or deficient)
- Compliance schedules
- Magnitude of the violation
- Duration of the violation
- Frequency of the violation (isolated or recurring)
- (potential) impact of the violation (e.g., interference, pass through, or POTW worker safety)
- Economic benefit gained by the violator
- Attitude of the violator

How Complete is Your ERG?

Q: Is a Control Authority response required for all violations identified?

Q: Is the IU notified by the Control Authority when a violation is found?

Q: Is the IU required to respond to each violation with an explanation and, as appropriate, a plan to correct the violation within a specified time period?

Q: Where noncompliance continues and/or the IU response is inadequate, does the Control Authority's response become more formal and commitments (or schedules, as appropriate) for compliance established in an enforceable document?

Q: Is the enforcement response selected related to the seriousness of the violation?

Q: Where the violation constitutes SNC, and is ongoing, is the minimum response an administrative order?

The types of questions that dictate whether an ERP is adequate are presented above. Factors that should be considered in determining appropriate enforcement responses to noncompliance events are discussed in detail in the EPA's 1989 *Guidance for Developing Control Authority Enforcement Response Plan*s.

The General Pretreatment Regulations set as an enforcement priority, facilities that meet the criteria for “***Significant Noncompliance*** (**SNC**)” as defined in 40 CFR §403.8(f)(2)(vii) and depicted in Figure 27. A decision to seek formal enforcement is generally triggered by an unresolved instance of SNC, failure to achieve compliance in a specified time period through less formal means, or the advice of legal counsel.

SNC evaluations are to be conducted in six-month increments; names of IUs found to be in SNC must be published in the local newspaper (see Public Participation in this Chapter).

Formal enforcement must be supported by well-documented records of the violations and of any prior efforts by the Control Authority to obtain compliance. Where effluent limitations have been exceeded, records must be reviewed to verify compliance with 40 CFR Part 136 test methods. If the IU has received conflicting information from the Control Authority regarding its compliance status, its status must be clarified in writing.

Although not required, the Control Authority may consider a "**show cause**" meeting with the IU before commencing formal enforcement action. Similarly, the regulations do allow, in certain instances, an affirmative defense for violations. The range of enforcement mechanisms available to a Control Authority depends on the specific legal authorities it has been given by city, county, and State legislatures. These mechanisms may range from a simple telephone call to suits seeking significant criminal penalties. Common enforcement mechanisms include:

Informal notice to IU - This may consist of a telephone call or "***reminder***" letter to an appropriate IU official to notify them of a minor violation and to seek an explanation.

Such informal notice may be used to correct minor instances of noncompliance.

Administrative Tools

Informal meetings - Used to obtain an IU's commitment to comply with their pretreatment obligations or to inform the IU of stronger enforcement mechanisms available for unresolved and/or continued, noncompliance.

Warning letter or Notice of Violation (NOV) - Written notice to the IU in response to a violation of pretreatment standards or requirements. These notices should request an explanation of the noncompliance and measures that will be taken to eliminate future violations.

Administrative orders and compliance schedules - These require an IU to "**show cause**" to the Control Authority as to why formal enforcement action should not be taken and/or sewer service discontinued, or actions that will be taken to comply with pretreatment standards or requirements. Orders as such may be negotiated (i.e., Consent Order) or issued at the reasonable discretion of the Control Authority (i.e., Compliance Order).

For more egregious or serious violations, the Control Authority may issue a Cease and Desist Order.

Administrative fines - Assessed by Control Authorities against IUs for violations and intended to recapture partial or full economic benefit for the noncompliance and to deter future violations.

Civil suits - Formal process of filing lawsuits against IUs to correct violations and to obtain penalties for violations. Civil penalty amounts are generally limited through State or municipal laws. However, 40 CFR §403.8(f)(1)(vi) requires that Control Authorities have the legal authority to seek or assess civil or criminal penalties of at least $1,000 per day for each violation.

A civil suit for injunctive relief may be used when the IU is unlikely to successfully execute the steps that the Control Authority believes are necessary to achieve or maintain compliance, when the violation is serious enough to warrant court action to deter future similar violations, or when the danger presented by an IU's lengthy negotiation of a settlement is intolerable.

NOTE: Surcharges are not penalties or fines. Surcharges are intended to recoup the cost of treatment of wastes by the POTW and must not be used to allow discharges of toxic pollutants that cause interference or pass through.

Definition of Significant Noncompliance (SNC) An IU is in SNC if its violation meets one or more of the following criteria (40 CFR 403.8(f)(2)(vii):
(A) Chronic violations of wastewater discharge limits, defined here as those in which sixty-six percent or more of all of the measurements taken during a six-month period exceed **(by any magnitude)** the daily maximum limit or the average limit for the same pollutant parameter;
(B) Technical Review Criteria (TRC) violations, defined here as those in which thirty-three percent or more of all of the measurements for each pollutant parameter taken during a six-month period equal or exceed the product of the daily maximum or the average limit multiplied by the applicable TRC (TRC = 1.4 for BOD 5 , TSS, fats, oil, and grease, and 1.2 for all other pollutants except pH);
(C) Any other violation of a pretreatment effluent limit (**daily maximum or longer-term average**) that the Control Authority determines has caused, alone or in combination with other discharges, interference or pass through (including endangering the health of POTW personnel or the general public);
(D) Any discharge of a pollutant that has caused imminent endangerment to human health, welfare or to the environment or has resulted in the POTW's exercise of its emergency authority under 40 CFR § 403.8(f)(1)(vi)(B) of this section to halt or prevent such a discharge;

(E) Failure to meet, within 90 days after the schedule date, a compliance schedule milestone contained in a local control mechanism or enforcement order for starting construction, completing construction, or attaining final compliance;
(F) Failure to provide, within 30 days after the due date, required reports such as baseline monitoring reports, 90-day compliance reports, periodic self-monitoring reports, and reports on compliance with compliance schedules;
(G) Failure to accurately report noncompliance;
(H) Any other violation or group of violations which the Control Authority determines will adversely affect the operation or implementation of the local pretreatment program.

Criminal Prosecution

This type of enforcement is a formal judicial process where sufficient admissible evidence exists to prove beyond a reasonable doubt that a person has willfully or negligently violated pretreatment standards or that a person has knowingly made a false statement regarding any report, application, record, or other document required by the General Pretreatment Regulations.

As noted above, Control Authorities must have the legal authority to seek or assess civil or criminal penalties of at least $1,000 per day for each violation. Examples of criminal violations include falsification of data and tampering with sampling results or equipment.

Termination of service (revocation of permit) - These actions may be pursued by Control Authorities to immediately halt an actual or threatened discharge to the POTW that may represent an endangerment to the public health, the environment, or the POTW. Use of these remedies may also be used in bringing recalcitrant users into compliance.

Regardless of the response taken, the Control Authority should document and track all contact, notices, and meetings with IUs and IU responses. Control Authority responses and IU responses (or lack thereof) should be documented and include a record of any direct contact with the IU to attempt to resolve the noncompliance.

Control Authorities must take timely and effective enforcement against violators. Unresolved IU noncompliance may result in the Approval Authority enforcing directly against the IU and/or the Control Authority. The EPA may also take enforcement action where it deems action by the State or the Control Authority is inappropriate. An Approval Authority will routinely review the overall performance of a Control Authority in monitoring IUs, identifying violations, and in enforcing regulations.

Performance will be evaluated based on POTW self-monitoring data, written enforcement response plans, audits, inspections, and pretreatment program reports. Therefore, it is essential for Control Authorities to effectively manage program information to demonstrate proper implementation. Section 505 of the CWA allows citizens to file suit against a Control Authority that has failed to implement its approved pretreatment program as required by its NPDES permit. The Control Authority may be fined as well as required to enforce against violations of pretreatment standards and requirements in a court order.

ENFORCEMENT RESPONSE PLAN EVALUATION CHECKLIST

Name of POTW:	**Date of Review:**

Requirement	YES	NO	N/A	Section Reference
A. Does the Enforcement Response Plan (ERP) describe how the POTW will investigate instances of noncompliance?				
1. Does it indicate that inspections and sampling will be used as a means to identify IU noncompliance?				
2. Does it indicate that inspections and sampling will be used as a means to follow-up on IU noncompliance?				
3. Does it identify personnel responsible for conducting inspections and sampling?				
4. Does it identify personnel responsible for entering inspection and sampling results into the IU's file?				
5. Does it specify time frames for entering inspection and sampling data?				
6. Does it describe procedures for tracking and reviewing (including evaluating report completeness and accuracy) all IU reports and notifications?				
7. Does it specify personnel responsible for reviewing reports and notifications?				
8. Does it specify personnel responsible for recommending enforcement action?				
9. Does it describe procedures for tracking responses to enforcement actions?				
10. Does it include appropriate procedures for determining violations and calculating SNC based on continuous pH monitoring?				
11. Does it clearly indicate the enforcement response that will be taken in response to SNC, including causing interference, pass through, filing late reports, etc.?				
12. Does it indicate that the POTW will respond to instances of SNC with an enforceable order within 30 days of identification?				
B. Does the ERP describe the types of escalating enforcement responses the POTW will take in response to all anticipated types of violations?				
1. Does it identify all possible types of noncompliance, including:				
a. Discharge without a permit (no harm)				
b. Discharge without a permit (harm)				
c. Failure to renew permit				

Requirement	YES	NO	N/A	Section Reference
d. Isolated violations of discharge limit (no harm)				
e. Isolated violations of discharge limit (harm)				
f. Recurring violation of discharge limit (no harm)				
g. Recurring violation of discharge limit (harm)				
h. Reported slug load (no harm)				
i. Reported slug load (harm)				
j. Late report				
k. Report is incomplete				
l. Failure to monitor all regulated pollutants				
m. Report is improperly signed or certified				
n. Failure to submit a report or notice				
o. Falsification of data				
p. Use of improper sampling procedures				
q. Failure to install monitoring equipment				
r. Missed compliance schedule milestones (no effect on final compliance date)				
s. Missed compliance schedule milestones (effect on final compliance date)				
t. Use of dilution instead of treatment				
u. Failure to properly operate and maintain pretreatment equipment				
v. Denial of entry to POTW personnel				
w. Failure to maintain records				
x. Failure to report additional monitoring				
2. Does the ERP reflect the full range of enforcement responses that are allowed under State law and the POTW’s sewer use ordinance?				
3. Does the POTW’s sewer use ordinance provide adequate legal authority for all enforcement actions the POTW proposes to initiate?				
4. When identifying appropriate enforcement actions, does the ERP allow for consideration of the following factors?				
a. Magnitude of the violation				
b. Duration of the violation				
c. Effect on receiving water				
d. Effect on POTW				
e. IU’s compliance history				

Requirement	YES	NO	N/A	Section Reference
f. IU's good faith				

Requirement	YES	NO	N/A	Section Reference
5. Does the ERP adequately describe procedures for escalating enforcement responses?				
6. Does the ERP include associated time frames for all activities including data review, initial and escalated enforcement actions, and follow-up actions?				
7. Does the ERP indicate that data will be reviewed no later than 5 working days after its receipt?				
8. Does the ERP indicate that initial enforcement actions will be taken no more than 30 days after detection of a violation?				
9. Do the proposed time frames in the ERP for initial enforcement actions make sense? For example, will NOVs be issued more promptly than more stringent enforcement action?				
10. Does the ERP allow for strong enforcement action to be taken immediately in the event of a major violation?				
11. Does the ERP indicate that initial follow-up compliance activities (e.g., inspections, sampling) will occur no later than 30 to 45 days after taking initial enforcement action?				
12. If the violation persists, does the ERP specify that escalating enforcement actions will be taken 60 to 90 days after the initial enforcement action?				
C. Does the ERP identify by title the persons responsible for each enforcement response?				
1. Are the positions described in the ERP consistent with those described in the POTW's program implementation procedures and sewer use ordinance?				
2. Do the positions identified in the ERP allow enforcement actions to be initiated in a timely and effective manner?				
D. Is the POTW's responsibility to enforce all pretreatment standards and requirements reflected in the ERP?				
1. Do the enforcement procedures in the ERP allow for final resolution of noncompliance? For example, is there a procedure to ensure that the same enforcement action will not be taken again and again without final resolution?				

Requirement	YES	NO	N/A	Section Reference
2. Are the procedures identified in the ERP consistent with those contained in the program implementation procedures and sewer use ordinance?				
E. In general, are the relevant elements of the ERP referenced and incorporated into other sections of the implementation manual?				

Data Management and Recordkeeping

Any IU subject to pretreatment program reporting requirements is required to maintain records resulting from monitoring in a readily accessible manner for a minimum of 3 years (longer if during periods of any ongoing litigation). While the means for maintaining files is usually at the discretion of the POTW, all pretreatment activities should be documented and the documents maintained.

Types of IU records that the Control Authority should maintain ***include:***

Types of IU Records Retained

- Industrial waste questionnaire
- Permit applications, permits and fact sheets
- Inspection reports
- IU reports
- Monitoring data (including laboratory reports)
- Required plans (e.g., slug control, sludge management, pollution prevention)
- Enforcement activities
- **All** correspondence to and from the IU
- Phone logs and meeting summaries.

Types of POTW Records Retained

- Legal authority (e.g., SUO)
- Program procedures
- Program approval and modifications
- Copy of POTW NPDES permit(s)
- Local limits development
- ERP
- Correspondence to and from the EPA/State
- Annual reports to the Approval Authority
- Public notices
- Funding and resource changes
- Applicable Federal and State regulations
- IU compliance and permitting records

Tracking due dates, submissions, deficiencies, notifications, etc. and calculating effluent limitation noncompliance may be facilitated by a computerized data management system. Similarly, many Control Authorities use standardized forms (e.g., inspection questionnaires, chains-of-custody, field measurement records) and procedures (e.g., sampling, periodic compliance report reviews) to promote consistency and organization of program data.

In addition to specific IU records, Control Authorities should also maintain general program files that document specific program development and implementation activities that are not IU-specific. All information should be filed in an orderly manner and be readily accessible for inspection and copying by the EPA and State representatives or the public.

The pretreatment regulations specify that all information submitted to the Control Authority or State must be available to the public without restriction, except for confidential business information.

Substantial Modifications of POTW *Figure 30*

Pretreatment Programs (40 CFR §403.18)

1. Modifications that relax POTW legal authorities (as described in 40 CFR §403.8(f)(1)), except for modifications that directly reflect a revision to 40 CFR Part 403, and are reported pursuant to 40 CFR §403.18(d) - Approval procedures for nonsubstantial modifications;
2. Modifications that relax local limits, except for modifications to local limits for pH and reallocations of the Maximum Allowable Industrial Loading of a pollutant that do not increase the total industrial loadings for a pollutant, which are reported pursuant to 40 CFR §403.18(d) - Approval procedures for nonsubstantial modifications;
3. Changes to POTW's control mechanism, as described in 40 CFR §403.(f)(1)(iii);
4. A decrease in the frequency of self-monitoring or reporting required of industrial users;
5. A decrease in the frequency of industrial user inspections or sampling by the POTW;
6. Changes to the POTW's confidentiality procedures; and
7. Other modifications designated as substantial modifications by the Approval Authority on the basis that the modification could have a significant impact on the operation of the POTW's Pretreatment Program; could result in an increase in pollutant loadings at the POTW; or could result in less stringent requirements being imposed on Industrial users of the POTW.

Public Participation and POTW Reporting

Section 101(e) of the CWA establishes public participation as one of its goals, in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the EPA or any State. The General Pretreatment Regulations encourage public participation by requiring public notices and/or hearings for program approval, removal credits, program modifications, local limits development and modifications, and IUs in SNC.

POTW pretreatment program approval requests require the Approval Authority to publish a notice (including a notice for a public hearing) in a newspaper of general circulation within the jurisdiction served by the POTW. All comments regarding the request, as well as any request for a public hearing must be filed with the Approval Authority within the specified comment period, which generally last 30 days.

The Approval Authority is required to account for all comments received when deciding to approve or deny the submission. The decision is then provided to the POTW and other interested parties, published in the newspaper with all comments received available to the public for inspection and copying.

Once a local pretreatment program is approved, the Control Authority must implement that program as approved. Before there is a significant change in the operation of a POTW pretreatment program, a program modification must be initiated. For substantial program modifications (see Figure 30), the Control Authority is required to notify the Approval Authority of the desire to modify its program and the basis for the change. These changes become effective upon approval.

Approval Authorities (or POTWs) are required to give public notice of the request for a modification, but are not required to notify the public of the decision if no comments are received and the request is approved without changes. Nonsubstantial modifications must also be submitted to the Approval Authority for review and approval, but these changes do not require public notice.

And unlike substantial modifications, nonsubstantial modifications become effective 45 days after submission unless the Approval Authority notifies the POTW otherwise.

Industrial User Pretreatment Program Responsibilities

Industrial Users (**IUs**) are required to comply with all applicable pretreatment standards and requirements. Demonstration of compliance requires certain IUs to submit reports, self-monitor, and maintain records. A summary of the reporting requirements are provided in Figure 32, with details of each of these requirements discussed below.

Reporting Requirements

Minimum Federal Pretreatment Program reporting requirements for IUs are specified in 40 CFR §403.12. Since Control Authorities are responsible for communicating applicable standards and requirements to IUs and for receiving and analyzing reports, it is essential for Control Authority personnel to understand IU reporting and notification requirements contained in the General Pretreatment Regulations. These requirements are summarized below.

Categorical Industrial User (CIU) Reporting Requirements

Baseline Monitoring Report (**BMR**) [40 CFR §403.12(b)]

Each existing IU that is subject to a categorical pretreatment standard (identified as a Categorical Industrial User, or CIU) is required to submit a BMR within 180 days after the effective date of the standard.

If a category determination has been requested, the BMR is not due until 180 days after a final administrative decision has been made concerning the industry's inclusion in the category. The BMR must contain the following information:

- Name and address of the facility and names of the operator and owners.
- List of all environmental control permits held by, or for, the facility.
- Description of operations, including the average rate of production, and applicable Standard Industrial.

SIC Codes

Classification (**SIC**) codes, schematic process diagrams, and points of discharge to the POTW from regulated processes:

- ✓ Flow measurements (average daily and maximum daily) for regulated process wastestreams and nonregulated wastestreams, where necessary.
- ✓ Pollutant measurements [daily maximum, average concentration, and mass (where applicable)] and applicable standards.
- ✓ Certification, by a qualified professional (reviewed by a representative of the CIU), of whether applicable pretreatment standards are being met and, if not, a description of the additional operation and maintenance (**O&M**) or pretreatment facilities that are needed to comply with the standards.
- ✓ A schedule by which the IU will provide the additional O&M or pretreatment needed to comply with the applicable pretreatment standards.

BMRs

In addition to the certification noted above, BMRs must be signed and certified as detailed in 40 CFR §403.12(l) and as described later in this Chapter. If a CIU has already submitted the specific information required in a permit application or data disclosure form and this information is still current, it need not be reproduced and resubmitted in the BMR. The BMR is a one-time report, unless changed Federal categorical standards require submission of a new BMR.

At least 90 days prior to commencement of discharge, new sources are required to submit the above information (excluding the certification and compliance schedule), as well as information on the method that the source intends to use to meet the applicable pretreatment standards.

Compliance Schedule Progress Report [40 CFR §403.12(c)(3)]

A CIU that is not in compliance with applicable categorical standards by the time the standards are effective often will have to modify process operations and/or install end-of-pipe treatment to comply. Federal regulations require that the Control Authority develop and impose a compliance schedule for the CIU to install technology to meet applicable standards. As part of the BMR, a CIU that is unable to comply with the categorical standards must include a schedule for attaining compliance with the discharge standards.

In no case can the final or completion date in the schedule be later than the final compliance date specified in the categorical standards.

If deemed appropriate, the Control Authority may require compliance earlier than the final compliance date specified in the Federal regulations.

Compliance schedules are to contain increments of progress in the form of dates (not to exceed nine months per event) for commencement and completion of major actions leading to construction and operation of a pretreatment system and/or in-plant process modifications. Major activities could include hiring an engineer, completing preliminary analysis and evaluation, finalizing plans, executing a contract for major components, commencing construction, completion of construction, or testing operations.

In addition, the CIU must submit progress reports to the Control Authority no later than 14 days following each date in the compliance schedule (and final date for compliance), that include:

- A statement of the CIU's status with respect to the compliance schedule
- A statement of when the CIU expects to be back on schedule if it is falling behind, and the reason for the delay and steps being taken by the IU to return to the established schedule.

The Control Authority should review these reports as quickly as possible. When a CIU is falling behind schedule, the Control Authority should maintain close contact with the CIU. If the CIU fails to demonstrate good faith in meeting the schedule, the Control Authority may consider initiating appropriate enforcement action to correct the problem(s).

90-Day Compliance Reports [40 CFR §403.12(d) Section 403.12(d)] of the General Pretreatment Regulations requires a CIU to submit a final compliance report to the Control Authority.

An existing source must file a final compliance report within 90 days following the final compliance date specified in a categorical regulation or within 90 days of the compliance date specified by the Control Authority, whichever is earlier. A new source must file a compliance report to the POTW within 90 days from commencement of discharge.

These reports must contain:

- Flow measurements (average daily and maximum daily) for regulated process wastestreams and nonregulated wastestreams, where necessary.
- Pollutant measurements [daily maximum, average concentration, and mass (where applicable)] and applicable standards.
- Certification, by a qualified professional, reviewed by a representative of the CIU, of whether pretreatment standards are being met and, if not, a description of the additional operation and maintenance (O&M) or pretreatment facilities that are needed to comply with the standards.

In addition to the certification noted above, 90-day final compliance reports must be signed and certified as detailed in 40 CFR §403.12(l) and as described later in this Chapter.

Figure 31. Definition of Upset (40 CFR §403.16)

Upset is defined as an exceptional incident in which there is unintentional and temporary noncompliance with categorical standards due to factors beyond the reasonable control of the CIU. An upset does not include noncompliance to the extent caused by operational error, improperly designed or inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

CIUs are allowed an affirmative defense for noncompliance with categorical standards if they can demonstrate that the noncompliance was the result of an upset (Figure 31).

Conditions necessary to demonstrate an upset has occurred are detailed in 40 CFR §403.16 and require the CIU to submit at least an oral report to the Control Authority within 24 hours of becoming aware of the upset and containing the following information:

- a description of the indirect discharge and the cause of the noncompliance
- the date(s) and times of the noncompliance
- steps being taken and/or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

If this notification is provided orally, a written report must also be submitted within five days.

In any enforcement action, the IU has the burden of proof in establishing that an upset has occurred. The EPA is responsible for determining the technical validity of this claim.

Categorical and Significant Industrial User (SIU) Reporting Requirements
Periodic Compliance Reports [40 CFR §403.12 (e) & (h)]

After the final compliance date, CIUs are required to report, during the months of June and December, the self-monitoring results of their wastewater discharge(s).

The Control Authority must also require semi-annual reporting from SIUs not subject to categorical standards. The EPA established a minimum frequency of once every six months, determining this to be adequate for small SIUs or other facilities that have little potential to cause pass-through or interference or to contaminate the sewage sludge.

Periodic Compliance Reports

The EPA assumed that larger IUs and those that have more potential to cause problems would be required by the Control Authority to sample and report more often. All results for self-monitoring performed must be reported to the Control Authority, even if the IU is monitoring more frequently than required. Periodic compliance reports must include:

- nature and concentration of pollutants limited by applicable categorical standards or required by the Control Authority.
- flow data (average and maximum daily) as required by the Control Authority.
- mass of pollutants discharged (applicable to CIUs where mass limits have been imposed).
- production rates (applicable to CIUs where equivalent limits have been imposed or where limits imposed are expressed in allowable pollutant discharged per unit of production).

A Control Authority may choose to monitor IUs in lieu of the IU performing the self-monitoring. Additionally, 40 CFR §403.12(e) and (h) require compliance with 40 CFR Part 136 (Guidelines for Establishing Test Procedures for the Analysis of Pollutants).

To demonstrate compliance with these requirements, IUs may have to submit information regarding sample handling and analytical procedures to the Control Authority.

Development of standardized forms for use by IUs and their testing labs can facilitate documentation and submission of all required information and can streamline the IU and Control Authority review process.

Bypass [40 CFR §403.17] The General Pretreatment Regulations define *"**bypass**"* as the intentional diversion of wastestreams from any portion of a user's treatment facility. If a bypass results in noncompliance, even if it was due to essential maintenance, the IU must provide a report to the Control Authority detailing a description of the bypass and the cause, the duration of the bypass, and the steps being taken and/or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

Oral notice must be provided to the Control Authority within 24 hours of the detection of an unanticipated bypass, with a written follow-up due within 5 days. For an anticipated bypass, the IU must submit notice to the Control Authority, preferably 10 days prior to the intent to bypass.

Notification of Potential Problems [40 CFR §403.12(f)]

All IUs are required to notify the Control Authority immediately of any discharges which may cause potential problems. These discharges include spills, slug loads, or any other discharge which may cause a potential problem to the POTW.

Noncompliance Notification [40 CFR §403.12(g)(2)]

If monitoring performed by an IU indicates noncompliance, the IU is required to notify the Control Authority within 24 hours of becoming aware of the violation. In addition, the IU must repeat sampling and analysis, and report results of the re-sampling within 30 days.

The repeat sampling is not required if the Control Authority samples the IU at least once per month or if the Control Authority samples the IU between the time of the original sample and the time the results of the sampling are received.

Notification of Changed Discharge [40 CFR §403.12(j)]

All IUs are required to promptly notify the Control Authority in advance of any substantial changes in the volume or character of pollutants in their discharge.

Notification of Discharge of Hazardous Wastes [40 CFR §403.12(p)]

IUs discharging more than 15 kilograms per month of a waste, which if otherwise disposed of, would be a hazardous waste pursuant to the RCRA requirements under 40 CFR Part 261 are required to provide a one time written notification of such discharge to the Control Authority, State, and the EPA.

IUs discharging any amount of waste, which if disposed of otherwise, would be an acutely hazardous waste pursuant to RCRA must also provide this notification. This written notification must contain the EPA hazardous waste number and the type of discharge (i.e., batch, continuous).

If the IU discharges more than 100 kilograms per month of the hazardous waste, the written notification must also include:

- ✓ An identification of the hazardous constituent in the IU's discharge,
- ✓ An estimate of the mass and concentration of the constituents in the IU's discharge, and
- ✓ An estimate of the mass and concentration of constituents in the IU's discharge in a year.

IUs must also provide a certification accompanying this notification that a waste reduction program is in place to reduce the volume and toxicity of hazardous wastes to the greatest degree economically practical.

Within 90 days of the effective date of the listing of any additional hazardous wastes pursuant to RCRA, IUs must provide a notification of the discharge of such wastes.

Signatory and Certification Requirements [40 CFR §403.12(l)]
Pursuant to 40 CFR §403.12(l), BMRs, 90-day compliance reports and periodic compliance reports from CIUs must be signed by an authorized representative of the facility and contain a certification statement attesting to the integrity of the information reported. The reports should be signed by one of the following:

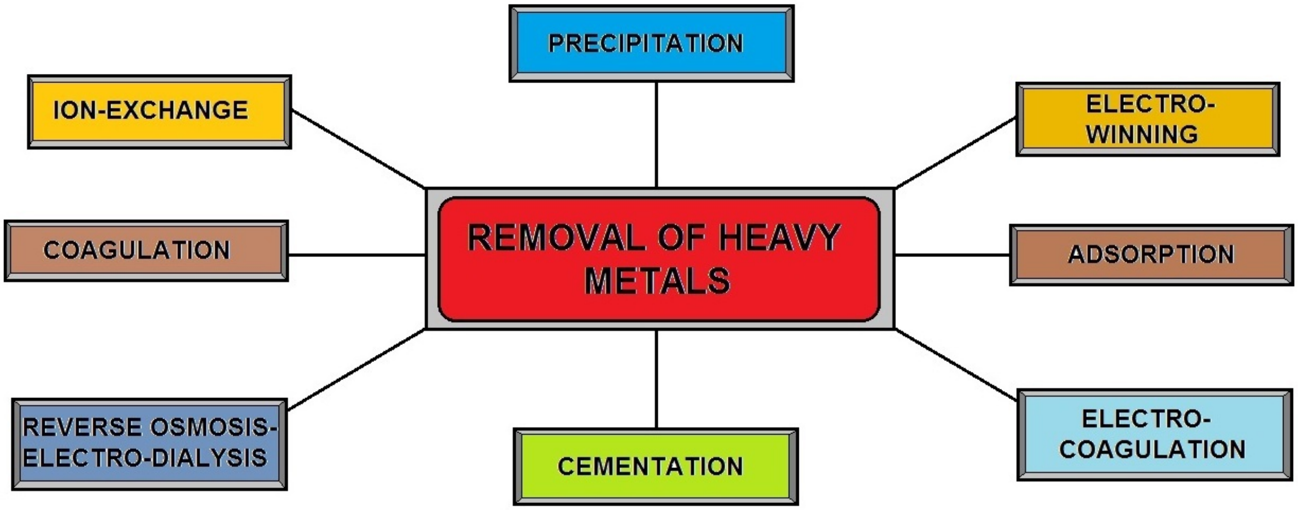
- ✓ A responsible corporate officer if the IU is a corporation.
- ✓ A general partner or proprietor if the IU is a partnership or sole proprietorship.
- ✓ A duly authorized representative of the above specified persons if such authorization is in writing, submitted to the Control Authority and specifies a person or position having overall responsibility for the facility where the discharge originates or having overall responsibility of environmental matters for the facility.

As required in 40 CFR §403.6(a)(2)(ii), the certification statement must read as follows:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

While Federal regulations only require Control Authorities to require these signatures and certifications from CIUs, many POTWs have found it important to impose these requirements for all IU reports. To facilitate compliance, many Control Authorities have developed forms that include the certification statement and signatory requirements for use by all IUs.



METHODS TO REMOVE HEAVY METALS IN WATER

Grab Sample
A sample which is taken from a wastestream on a one-time basis with no regard to the flow of the wastestream and without consideration of time. A single grab sample should be taken over a period of time not to exceed 15 minutes.

Self-Monitoring Requirements

All SIUs, including CIUs must conduct self-monitoring as part of several different reporting requirements as noted above. For CIUs, this includes the BMR, 90-day compliance report and periodic compliance reports (40 CFR §§403.12(b),(d), and (e), respectively). Non-categorical SIUs are required to self-monitor as part of the periodic reporting requirements (40 CFR §403.12(h)). As noted in 40 CFR §§403.12(g)(4), sample collection and analysis for all required pretreatment program reports must be conducted using 40 CFR Part 136 procedures and amendments thereto.

Refer to Chapter 4 of this manual and the EPA's 1994 *Industrial User Inspection and Sampling Manual for POTWs* for additional information on sample collection and analysis procedures.

Based on the specific pollutants regulated by categorical standards, different types of samples may have to be collected. For BMR and 90-day compliance reports, a minimum of four grab samples must be collected for pH, cyanide, total phenols, oil and grease, sulfide, and volatile organics.

If these pollutants are not regulated by the specific categorical standard, monitoring is not required. Twenty-four hour flow-proportional composite samples must be collected for all other pollutants. The Control Authority may waive flow-proportional composite sampling if an IU demonstrates that flow-proportional is not feasible. In these cases, time-proportional composite samples may be collected.

Self-monitoring for periodic compliance reports must be conducted in accordance with the IU's discharge permit requirements. The Control Authority must ensure that these permits specify sampling location(s), required sampling frequencies, sample types to be collected, sampling and analytical procedures (40 CFR Part 136), and associated reporting requirements. At a minimum, CIUs must monitor for all categorically regulated pollutants at least once every six months, although permits issued by the local Control Authority may require more frequent monitoring.

TTO
In certain instances, CIUs subject to TTO standards may implement alternatives in lieu of monitoring all regulated toxic organic compounds.

TOMP
For example, the electroplating and metal finishing standards allow IUs to monitor only for those toxic organic compounds that are reasonably expected to be present. Additional TTO guidance related to the electroplating and metal finishing categories can be found in the EPA's 1984 *Guidance Manual for Electroplating and Metal Finishing Pretreatment Standard*s.

For certain industries (i.e., electroplating, metal finishing, and electrical and electronic components) Control Authorities have the option of allowing the CIU to prepare and implement a Toxic Organic Management Plan (**TOMP**) in lieu of periodic monitoring.

In those instances, the TOMP should identify all potential sources from which toxic organic materials could enter the wastestream and propose control measures to eliminate the possibility. Where a TOMP is allowed, an IU can demonstrate compliance through adherence to the TOMP and submission of periodic certification statements attesting to the fact that: *"no dumping of concentrated toxic organic pollutants has occurred and that the facility's TOMP is being implemented."*

TOMPs cannot be used in lieu of monitoring for BMRs and 90-day compliance reporting requirements. The categorical standards for some industries (i.e., aluminum forming, copper forming, coil coating, and metal molding and casting) allow IUs to monitor oil and grease (**O&G**) as an alternative to TTO monitoring.

This option may be used to fulfill TTO monitoring requirements of the BMR, 90-day compliance report, and periodic compliance reports and allows the IU to determine whether it wants to demonstrate compliance with the TTO or the O&G standards. A detailed description of TTO monitoring requirements is provided in the EPA's 1985 *Guidance Manual for Implementing Total Toxic Organics (TTO) Pretreatment Standard*s.

Recordkeeping Requirements

IUs are required to maintain records of their monitoring activities [40 CFR §403.12(O)]. Information, at a minimum, shall include the following:

- sampling methods, dates and times,
- identity of the person(s) collecting the samples and of the sampling location(s),
- the dates the analyses were performed and the methods used,
- the identity of the person(s) performing the analyses and the results of the analyses.

These records shall be retained for at least 3 years, or longer in cases where there is pending litigation involving the Control Authority or IU, or when requested by the Approval Authority.

These records must be available to the Control Authority and Approval Authority for review and copying. Historically, most Control Authorities do not dispose of any records; rather, older records are archived at an off-site location.

Figure 32. Industrial User Reporting Requirements

REQUIRED REPORT AND CITATION	APPLY TO	REPORT DUE DATE	PURPOSE OF REPORT
Baseline Monitoring Report (BMR) *40 CFR §403.12(b)(1-7)*	CIUs	Existing Source - Within 180 days of effective date of the regulation or an administrative decision on category determination. New Source - At least 90 days prior to commencement of discharge.	- To provide baseline information on industrial facility to Control Authority - To determine wastewater discharge sampling points - To determine compliance status with categorical pretreatment standards
Compliance Schedule Progress Reports *40 CFR §403.12(c)(1-3)*	All IUs	Within 14 days of each milestone date on the compliance schedule; at least every 9 months.	- To track progress of the industrial facility through the duration of a compliance schedule.
90-Day Compliance Report *40 CFR §403.12(d)*	CIUs	Within 90 days of the date for final compliance with applicable categorical pretreatment standard; for new sources, the compliance report is due within 90 days following commencement of wastewater discharge to the POTW.	- To notify Control Authority as to whether compliance with the applicable categorical pretreatment standards has been achieved - If facility is noncompliant, to specify how compliance will be achieved.
Periodic Compliance Report *40 CFR §403.12(e)*	CIUs	Every June and December after the final compliance date (or after commencement of a discharge for new sources) unless frequency is increased by the Control Authority.	- To provide the Control Authority with current information on the discharge of pollutants to the POTW from categorical industries.
Notice of Potential Problems *40 CFR §403.12(f)*	All IUs	Notification of POTW immediately after occurrence of slug load, or any other discharge that may cause problems to the POTW.	- To alert the POTW to the potential hazards of the discharge.
Noncompliance Notification *40 CFR §403.12(g)(2)*	All IUs	Notification of POTW within 24 hours of becoming aware of violation.	- To alert the POTW of a known violation and potential problems which may occur.
Periodic Compliance Reports for Noncategorical Users *40 CFR §403.12(h)*	Non-Cat. SIUs	Every six months on dates specified by the Control Authority.	- To provide the POTW with current information on the discharge of pollutants to the POTW from industrial users not regulated by categorical standards.
Notification of Changed Discharge *40 CFR §403.12(j)*	All IUs	In advance of any substantial changes in the volume or character of pollutants in the discharge.	- To notify POTW of anticipated changes in wastewater characteristics and flow which may affect the POTW.
Notification of Hazardous Wastes Discharge *40 CFR §403.12(p)*	All IUs	For new discharges, within 180 days after commencement of discharge.	- To notify POTW, EPA, and State of discharges of hazardous wastes under 40 CFR Part 261.
Upset *40 CFR §403.16*	CIUs	24 hours of becoming aware of the upset (5 days where notification was provided orally)	- To notify the POTW of unintentional and temporary noncompliance with categorical standards.
Bypass *40 CFR §403.17*	All IUs	10 days prior to date of the bypass or oral notice within 24 hours of the IU becoming aware of the bypass with written notification within 5 days.	- To notify the POTW of noncompliance and potential problems which may occur

Examples of Enforcement and Regulatory Letters

____
Contact Person

____
Company Name

____
Company Address

____
City, State, Zip

Certified Mail

Return Receipt Requested

OR

Hand Delivered

Rec'd by ________________Date__________
Company Name

NOTICE OF VIOLATION
RE: Reporting

Wastewater Discharge Permit# ________________issued to____________________________
Permit issue No. Company Name
requires ____to submit______________________
Company Name Type of Report
reports to the City of Sunflower_____________________________________
Qualification of Report
The report submitted by ______________________________________on_________________
Individual or Company Name Date Received by E &
for____________________________was due on _________________, ______________
Description or Violation Date Number
days late. _______________________________is therefore in violation with its permit.
Company Name

_____________________________is required to submit to the Enforcement
Company Name
and Monitoring Section a written report outlining the reason(s) for failure to meet this

requirement and detailing the corrective action(s) taken to prevent future violations.

This receipt must be received by_____________________
Mailing date + 15 Days (ESTABLISHED BY SECRETARY)
Failure to comply with the requirements of this letter will subject__________________________
Company Name
to further enforcement action(s). This Notice does not preclude the City from taking additional

enforcement action(s) under Chapter 10 of the Sunflower City Code.

Should you have any questions regarding this Notice, please contact Water Quality Division at 474-8888. Our office hours are 7:00 a.m. to 3:30 p.m., Monday through Friday.

Sincerely,

____
Name of Inspector

____
Title

____
Department

Date

____
Representative

____
Company

____
Address

____
City, State, Zip

Dear____________________________:
Representative

Re: **NOTICE OF VIOLATION NO**. ____
Nov No. Assigned

Thank you for submitting the ____
Analysis, Report

required by the Notice of Violation (**NOV**) dated__________________________________,
Date

covering the ____violations (s).
Parameter (s)

____has met all the requirements of
Company

this Notice of Violation and no further action is required at this time. This letter does not preclude the City from taking additional enforcement action(s) under Chapter 10 of the Sunflower City Code.

Should you have any questions regarding this letter, please contact the Water Quality Division at 474-8888. Our office hours are 7:30 a.m. to 3:30p.m. Monday through Friday.

Sincerely,

____
Inspector

____
Title

NOTICE TO SHOW CAUSE

________________________________has been previously notified of _________________________ violations. In light of the pretreatment violations identified in the attached Notice)s) and in this Notice to Show Cause, the City of Sunflower, acting as the Control Authority pursuant to the legal authority established by Title 40, Code of Federal Regulations, Part 403, and in accordance with Chapter 10 of the Sunflower City Code, hereby notifies

_______________________________of its intent to utilize all appropriate

remedies to address these pretreatment violations. These remedies include monetary penalties.

Representatives from ____are required

to attend a Meeting to Show Cause to be held at:

Place: Water Quality Conference Room
POTW Waste Water Treatment Plant
8111 W. Montebello
Sunflower, AZ 85296

Date: __________, _________________

Time: _______________

During the Show Cause meeting, ______________________________________will be given the opportunity to respond to the allegations stated below and will be asked to show cause why the City should not seek monetary and / or other penalties in response to the following:

1. During the time period referred to above,

_____________________________discharged in violation of its permit on at least _________ occasion(s).

2. A____________________report was submitted ________days late.

3. A 24 Hour Notification was__________days late.

It is hereby requested that_______________________________________have in Attendance at this meeting persons knowledgeable about the matters alleged in this Notice as well as persons having decision making authority. Your representatives may be accompanied by legal counsel if you so desire.

A representative from the City Attorney's office may be present at the meeting. Any written response to this Notice that you would like us to consider must be in my office on or before_______________.

We would appreciate if you would let us know by____________________.

A copy of the latest edition of the City's Civil Penalty Policy together with the Civil Penalty Calculation Worksheet is enclosed.

Your failure to appear will mean that the City of Sunflower will take all appropriate enforcement action it deems necessary based on the facts as outlined in this notice and attachments.

Should you have any questions regarding this notice, please contact Water Quality Division at 474-8888. Our office hours are 7:00 a.m. to 3:30 p.m., Monday through Friday.

Sincerely,

Chris Binder,
Water Quality Supervisor

Company

<u>Certified Mail</u>

Hand delivered

NOTICE OF VIOLATION

RE: Permit Conditions

A review and evaluation of ____________________________’s ____________________

Report that was received on_____________________________________, indicates that

your monthly analysis for____was not included. The monthly analysis is required as indicated on your Wastewater Discharge Permit # ______________________, and also aids the City of Sunflower in determining compliance with the discharge standards.

____is therefore required to immediately

sample for ________________________and submit the analysis by ________________.

You are also required to submit a written report outlining the reason(s) for failure to meet this requirement and the corrective action(s) taken to prevent future violations.

This written report must be submitted by__________________________.

Failure to comply with the requirements of this letter will subject ____________________ to further enforcement action(s). This notice does not preclude the City from taking additional enforcement action(s) under Chapter 10 of the Sunflower City Code.

Should you have any questions regarding this notice, please contact Water Quality Division at 474-8888. Our office hours are 7:00 a.m. to 3:30 p.m., Monday through Friday.

____

Inspector

____
Contact Person

____
Company Name

____
Company Address

____
City, State, Zip

Certified Mail

Return Receipt Requested

OR

Hand Delivered

Rec'd by ________________Date__________
Company Name

NOTICE OF VIOLATION

RE: Effluent Limits (City Monitoring)

The discharge to sewer from ___________________________________ exceeded the maximum
Company Name
Allowable limit for _____________________as established in your Wastewater Discharge
Effluent
Permit No. ___________________

Date	Parameter	Discharge Concentration	Discharge Limit

______________________________is required to submit to the Enforcement and Monitoring
Company Name
section a detailed written report outlining the reason(s) the violation(s) occurred and the corrective action taken to prevent future violations. This report (must be/was) (submitted/received) (by/on)

____
Mailing Date + 15 Days (ESTABLISHED BY SECRETARY)

Failure to comply with the requirements of this letter will subject __________________________
Company Name
to further enforcement action(s).

This Notice does not preclude the City from taking additional enforcement action(s) under Chapter 10 of the Sunflower City Code.

Should you have any questions regarding this notice, please contact Water Quality Division at 474-8888.

Our office hours are 7:30 a.m. to 3:00 p.m., Monday through Friday.

____
Name of Inspector

____
Title

Company

Re: **Wastewater Discharge Permit Renewal**

Dear:

A review of ____’s industrial waste

file indicates that your Wastewater Discharge Permit # ______________________,

for your ____________________________facility expires____________________

In order for a valid permit to be issued, the enclosed Industrial Waste Permit Application

must be properly filled out and returned to our office by________________________.

Should you have any questions regarding these results, please contact Water Quality Division at 474-8888. Our office hours are 7:00a.m. to 3:30p.m., Monday through Friday.

Signature

Permit Appeals Process Example

(Section 7-88- Chapter 10, Sunflower City Code)

Any Permit applicant or Permittee (aggrieved party) may petition the Director to reconsider the conditions and limitations of a Permit issued or amended under the authority of Section 28-46(a) of the Sunflower City code by filing a petition for review with the Director within twenty (20) days of receipt of the Permit.

Failure to submit a timely petition for review shall be deemed to be a waiver of the administrative appeal.

In its petition, the aggrieved party must identify the Permit provisions objected to, specify in detail the reasons for objection, and present the alternative condition, if any, it seeks to place in the Permit.

The provisions of the Permit that are not objected to shall not be stayed pending the appeal.

If the Director fails to act within 30 days from receipt of the petition, it shall be deemed to be denied. Decisions not to reconsider the issued or amended Permit, not to issue a Permit, or not to amend a Permit shall be considered final administrative actions for purposes of judicial review.

The aggrieved party seeking judicial review of the final Permit decision may file a complaint with the Superior Court for Gila County, Arizona.

The petition for review should be addressed to:

Bill Walker, Superintendent
City of Sunflower
Pollution Control Division
8111 W. Montebello Ave
Sunflower, Arizona 85629

Zero Discharge Examples

May 14, 2020

Mr. Mike Ploughe
Plant Superintendent
Ploughe Products
8111 West Montebello Lane
Sunflower, Arizona 85027

RE: Class B Zero Process Discharge Permit inspection conducted by the City of Sunflower Pollution Control Division on July 12, 2001.

Dear Mr. Ploughe:

As per our phone conversation of July 18, 1995, the purpose of this letter is to clarify the findings listed in the inspection report, dated July 12, 1995. In the description of findings section of the inspection report, it was noted that "All hazardous wastes are shipped off site for disposal."

During the inspection it was noted that hazardous waste were in fact shipped off site for disposal from the former Ploughe Products (PP) location at 3632 West Heidi, Sunflower, Arizona. It was also noted that since PP relocated to 8111 West Montebello Lane, Sunflower, Arizona, no hazardous waste have been shipped off site for any reason.

Please be aware that your facility may be subject to solid or hazardous waste management requirements pursuant to the Federal Resource Conservation and Recovery Act (PL 94-580 as amended) and state hazardous waste management regulations.

The attached general material describes federal requirements for hazardous waste generators and transporters. This packet includes descriptions of hazardous waste management requirements, which may apply to your operation if it involves generating or transporting hazardous waste.

In order to insure that your operation comply with federal, state, and local hazardous waste management regulations, please review the enclosed material and consult the following agencies to determine all specific requirements that apply to your operation:

U.S. EPA
RCRA/Superfund
Washington, D.C.
Information Hotline
(800) 424-9346

Mr. Patrick Kuefler
Arizona Dept. of Environmental Quality
Hazardous Waste Compliance
3033 North Central Ave
Sunflower, AZ 85012
(602) 207-4105

Should you have any questions, please contact me at 474-8888. Our office hours are 8:00 a.m. to 5:00 p.m., Monday through Friday.

Sincerely,

Bill Fields
Water Quality Inspector

Ms. Melissa Durbin July 10, 2007
Environmental/ Safety Manager
ACME Corporation
556 North 39th Avenue
Sunflower, Arizona 85093

RE: WARNER POWDER COATING FACILITY INSPECTION
556 N. 39TH AVENUE, SUNFLOWER, AZ. 85093

ACME CORPORATION FACILITY INSPECTION
4325 W. MONROE AVENUE, SUNFLOWER, AZ 85093

Dear Ms. Davis:

Thank you again for your time and cooperation during inspection of the above-referenced facilities conducted by the City of Sunflower Pollution Control Division (PCD) on June 1, 1995. Inspection reports are attached for your information.

Based on the inspection findings and review of previously submitted Industrial Wastewater Permit Applications for both Warner Coatings and Acme Corporation (dated October 11, 2001 and January 30, 2001, respectively), PCD has determined that:

1) Warner Technical and Acme Corporation are subject to Categorical Standards for Metal Finishing, pursuant to Title 40 Code of Federal Regulations Part 433 (Metal Finishing Point Source Category, copy attached);

2) Pursuant to Sunflower City Code Chapter 28 Article VI (Industrial User and Pretreatment Requirements, copy attached), Warner Technical and Acme Corporation must obtain a Class B Zero Process Discharge Permit and a Zero Categorical Process Discharge Permit, respectively; to discharge existing process and non-process wastewater to the City sanitary sewer system.

Presently, PCD is processing a Class B Zero Categorical Process Discharge Permit for each facility. As you requested during the inspections, all future correspondence regarding Warner Technical Coatings or Acme Corporation will be directed to Able Lopez (Warner Technical Coatings Production Manager) and Willie Clinton (Acme Corporation Manufacturing Coordinator), respectively.

Should you have any questions, please contact me at 534-3681. Our office hours are 8:00 a.m. to 5:00 p.m., Monday through Friday.

Sincerely,

Bill Fields
Senior Water Quality Inspector

Chapter 6 Hauled Wastes

Definition of Domestic Septage
Domestic septage is defined as either the liquid or solid material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device, or similar treatment works that holds only domestic sewage.

Domestic septage does not include liquid or solid material removed from these systems that receives either commercial wastewater or industrial wastewater and does not include grease removed from a restaurant grease trap. [40 CFR Part 503.9(f)]

In addition to receiving wastes through the collection system, many POTWs accept trucked wastes, and in a few instances, wastes received via train. As specified in 40 CFR §403.1(b)(1), pollutants from non-domestic sources which are transported to the POTW by truck or rail are also subject to the General Pretreatment Regulations.

Hauled wastes, like wastes received through the collection system, have the potential to impact the POTW, making regulatory control of these wastes necessary. Recent studies have shown an increasing frequency of uncontrolled discharges to POTWs from waste haulers.

Because of their unique nature, waste haulers are not regulated in the same way as other types of IUs. Since no specific Federal regulatory controls exist, some POTWs have developed hauled waste control programs. For more information on hauled waste, refer to the EPA's 1998 *Guidance Manual for the Control of Waste Hauled to Publicly Owned Treatment Works*.

Plastic Containment Protection under Tanker Truck.

Nature of Hauled Wastes

Wastes are hauled to POTWs for several reasons. By far, the majority of hauled waste is domestic septage. Since these wastes are domestic in nature, treatment at a POTW is the most appropriate disposal method. Other types of wastes are also regularly hauled to POTWs for a variety of reasons, such as:

- the facility is located outside the jurisdictional boundaries of the POTW (e.g., located in rural areas) and is not connected to the collection system,
- the wastes may be known to cause collection system problems, but can be treated at the POTW (e.g., grease trap cleanout wastes),
- the facility is connected to the sewer but does not have the capacity to discharge the volume of waste generated (e.g., groundwater remediation activities at an IU),
- a POTW rejects acceptance of a waste from an IU forcing the IU to haul the waste to a different POTW that agrees to accept the waste.

Common to all these wastes is the fact that the POTW does not know for certain the nature and concentration of these wastes, as hauled, without implementing some type of control or surveillance program.

Control Programs

Section 403.5(b)(8) of the General Pretreatment Regulations specifically prohibits the introduction of any trucked or hauled pollutants to the POTW, except at discharge points designated by the POTW. This is the only pretreatment requirement specifically addressing hauled wastes. However, many POTWs have determined that additional controls are necessary to further limit these discharges and to prevent adverse impacts from these discharges.

These control programs include practices such as permitting, sampling, manifesting, surveillance, and other forms of hauler documentation. In many instances, these control programs have shifted the hauling of waste from one POTW to other POTWs that are not implementing such a program.

Most often, it is the smaller POTWs that do not have hauler control programs, including many POTWs that are not even required to implement Pretreatment Programs. The effect of this change from larger to smaller POTWs and from more to less control is that there has been an increase in negative impacts to POTWs and receiving streams.

Two apparent options for addressing this concern are for: (1) the smaller and non-pretreatment POTWs to initiate waste hauler control programs; or (2) the larger POTWs to institute sound control programs that will adequately regulate these wastes yet not drive these haulers to search for other less sound disposal alternatives.

POTW waste hauler control programs should address the following six elements:

Impact to POTW - Prior to acceptance of a new waste from a hauler, the POTW needs to evaluate the potential impacts to the POTW from this waste. POTWs may require haulers or generators of hauled waste to perform a treatability study to demonstrate the effectiveness of treatment on this waste. POTWs must evaluate the impacts of this waste when evaluating the adequacy of local limits as well as when developing or revising local limits.

Permitting - A permit is the most direct and efficient method of regulating waste haulers. Permits provide the opportunity to monitor and regulate haulers based on the nature of the hauled waste and the potential impacts of that waste on the POTW. Unique permit conditions may include: right of refusal, daily flow limitations, discharge time limitations, and manifesting requirements.

Discharge Point - As specified in the General Pretreatment Regulations, hauled waste can only be discharged at points designated by the POTW. This option is to provide the POTW with the ability to control and observe these discharges at specified locations, thereby minimizing the potential for adverse impacts.

Monitoring - The POTW should institute a monitoring program to evaluate the nature and concentration of discharges. Both POTW monitoring and hauler self-monitoring may be appropriate. Many POTWs require that all loads of hauled waste must be sampled, but analyses are only performed on a predetermined percentage of these wastes or when problems occur.

Unanalyzed samples are refrigerated and kept for several weeks or months until the POTW is certain that the waste has not impacted the POTW. The frequency of sampling may also be dependent on the variability of the waste. Each load from a hauler that delivers highly variable loads may have to be sampled and analyzed; whereas, a much smaller percentage may be appropriate for more consistent waste types. As noted earlier, all Federal, State, and local discharge limitations apply to these wastes. The POTW may also consider inspecting the waste generators to confirm the source of these wastes.

Hauler Documentation - The POTW should require waste haulers to document the source of wastes being discharged, potentially including manifests. Manifests should include general hauler information, information on the waste generator (e.g., name, address, and phone number), the type of wastes collected, volumes, known or suspected pollutants, and certification that the load is not a hazardous waste. A useful technique is to contact the waste generators to verify the information on the manifest.

Legal Authority - If not already in place, the POTW's local ordinance (and approved pretreatment program) should be modified to add language specifying all of the controls that are applicable to waste haulers. This will ensure that waste haulers and POTW personnel will know the procedures, expectations, liabilities, etc. associated with the control program.

In addition to the specific controls described above, POTWs should implement procedures to identify and eliminate illegal discharges. Procedures may include periodic sewer line sampling, surveillance of suspected illegal discharge points, education of industries regarding hauled waste, increased enforcement, and public awareness of illegal dumping.

Hauled Waste Concerns

Every hauled waste discharge has the potential to impact the POTW. Unlike discharges from IUs connected to the POTW, the makeup of a load of hauled waste is virtually unknown without some type of monitoring, be it visual or analytical. Even loads of domestic septage can cause problems at a POTW. The majority of waste haulers are reputable business people who provide a valuable service to the public and industry; however, the unique attributes of hauled waste can be devastating when unethical haulers dump incompatible wastes at POTWs.

Domestic septage can be partially digested, higher in metals concentrations than normal domestic wastes, or contain small amounts of household contaminants (e.g., cleaners). Similarly, disinfectants used in portable toilets have the potential to impact POTW operations. Receipt of hauled hazardous waste (as defined in the Resource Conservation and Recovery Act (**RCRA**) may not only impact POTW operations, but subject the POTW to additional reporting requirements. The Domestic Sewage Exclusion, specified in 40 CFR §261.4 (a)(1)(ii), provides that hazardous wastes mixed with domestic sewage are exempt from the RCRA waste regulations.

However, hazardous wastes received by truck or rail (or dedicated pipe) are not exempt from the regulations. POTWs that accept hazardous wastes from these sources are granted “**permit by rule**” status under RCRA (40 CFR §270.60(c)) provided that certain requirements are met. The two most significant conditions are that the POTW must be in compliance with all of its NPDES permit requirements and the waste must comply with all Federal, State, and local pretreatment requirements. Nationwide, very few POTWs are knowingly accepting hauled hazardous waste.

POTWs should be aware that hauled process wastes from facilities subject to Federal categorical pretreatment standards are still subject to those standards. This condition highlights the need for POTWs to have a clear understanding of the source of the waste since applicable standards may be based on the origin of that waste.

Another potential problematic waste is that from remedial site clean-up operations. Groundwater contaminated with gasoline or diesel fuel is by far the most common type of waste from these operations. While these wastes may contain flammable and toxic compounds (e.g., benzene and toluene), another concern is that large volumes of this waste at a small POTW may actually “**flush**” the treatment plant, thereby interfering with treatment operations. Similar concerns also exist for landfill leachate, another commonly hauled wastestream. Remedial wastes may also come from Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA**) sites, also known as Superfund sites. For CERCLA guidance, refer to the EPA’s 1990 *CERCLA Site Discharges to POTWs Guidance Manua*l.

Other concerns for POTWs that accept hauled wastes include:

- Illegal dischargers may be discharging toxic pollutants that can pass through or interfere with the POTW operations;
- Grease trap wastes can coat and inhibit POTW treatment operations;
- Local limits may not account for pollutants in hauled wastes;
- Hauled wastes may contain pollutants for which local limits do not exist; thus, the impacts of this waste are not readily identifiable;
- Hauled wastes may be unmixed and/or highly concentrated.

For further information on the acceptance of hazardous waste at POTWs, refer to the *Guidance Manual for the Identification of Hazardous Wastes Delivered to Publicly Owned Treatment Works by Truck, Rail, or Dedicated Pip*e.

Chapter 7 Pollution Prevention

As the nation's environmental laws and regulations have developed over the past three decades, a new paradigm has shifted the approach to waste management. Initially, the EPA focused on managing the pollution generated through treatment and disposal in an environmentally safe manner. However, we have learned that conventional treatment and disposal can transfer pollutants from one medium to another with no net reduction. In striving to meet new and often more stringent environmental laws, industries have found ways to reduce or prevent pollution at the source.

Recognizing that source reduction is more desirable than treatment and disposal, the EPA now emphasizes preventing or eliminating the generation of waste. The Pollution Prevention Act of 1990 (**PPA**) established pollution prevention (referred to as "**P2**") as a national objective.

Pollution Prevention Act PPA

Pollution prevention is indirectly defined in the **PPA** as source reduction. Source reduction is any practice that reduces or eliminates the creation of pollutants. Thus, the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) is reduced prior to recycling, treatment, or disposal. Source reduction can be achieved through equipment or technology modifications, process or procedural modifications, reformulation or redesign of products, substitution of raw materials, or improvements in housekeeping, maintenance, training, or inventory control.

The PPA established a pollution prevention hierarchy as national policy, declaring that:

- Pollution should be prevented or reduced at the source.
- Pollution that cannot be prevented should be recycled in an environmentally safe manner.
- Pollution that cannot be prevented or recycled should be treated in an environmentally safe manner.
- Disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.

Thus, under the Pollution Prevention Act, recycling, energy recovery, treatment, and disposal are not included within the definition of pollution prevention. However, some practices commonly described as "**in-process recycling**" may qualify as pollution prevention. Although recycling is not pollution prevention, as indicated in the hierarchy, it is the next desirable practice where pollution cannot be prevented or reduced.

Recycling conducted in an environmentally sound manner shares many of the advantages of prevention, for it can reduce the need for treatment or disposal and conserve energy and resources.

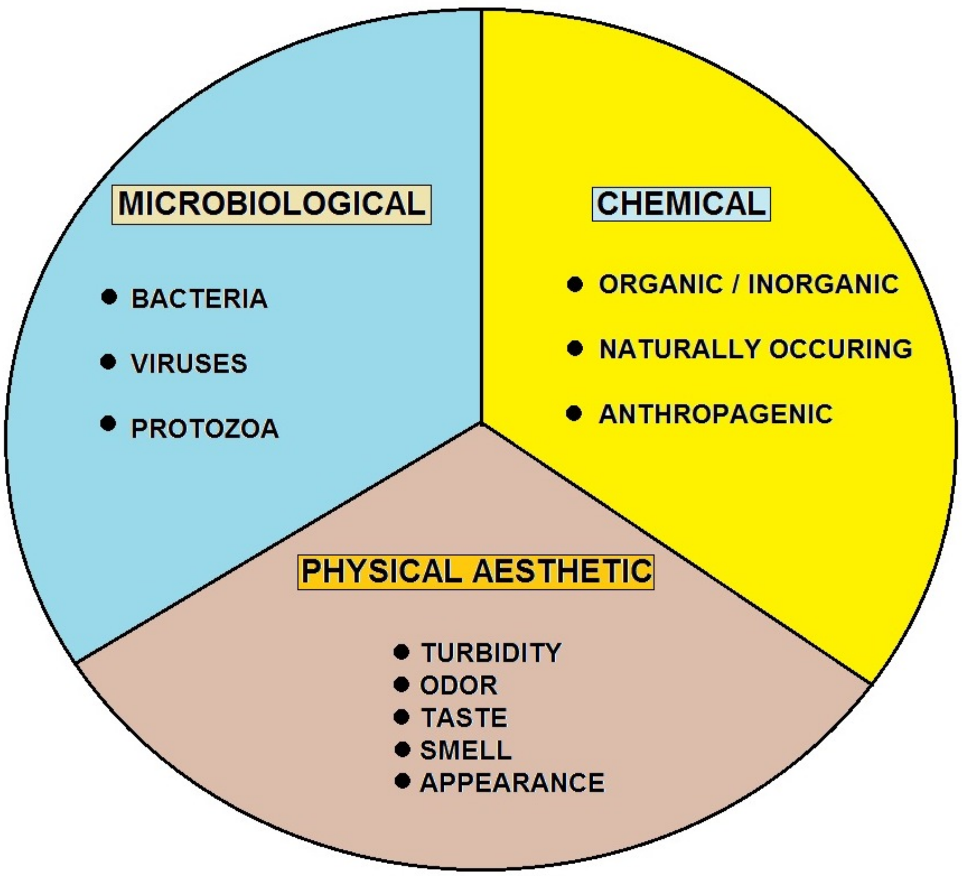
OPPTS

The EPA's Office of Pollution Prevention and Toxic Substances (**OPPTS**) developed a pollution prevention strategy for incorporating pollution prevention concepts into the EPA's ongoing environmental protection efforts.

The specific objectives of the strategy are to provide guidance and direction for efforts to incorporate pollution prevention within the EPA's existing regulatory and nonregulatory programs, and to set forth an initiative to achieve specific objectives in pollution prevention within a reasonable time frame.

The EPA's numerous activities include the following:

- Coordinating development of regulations that will help identify the potential for multi-media.
- Prevention strategies that reduce end of pipe compliance costs.
- Examining the use of pollution prevention in enforcement actions and negotiations.
- Investigating the feasibility of overcoming identified regulatory barriers to encourage cost effective (source reduction) strategies.
- Working with State and local governments and trade associations to promote pollution prevention among small and medium size businesses that often lack the capital to make changes.
- Investing in outside programs, usually States, by providing grant funds for the reduction of target chemicals, the agricultural and transportation industry, etc.
- Providing scientific and technical knowledge necessary to implement pollution prevention. initiatives on a cross media basis, pursuant to the Pollution Prevention Research Strategic Plan.



WATER QUALITY BROKEN DOWN INTO 3 BROAD CATEGORIES

Pollution Prevention and the Pretreatment Program

Although pollution prevention is not a required element of the National Pretreatment Program, source reduction is not new to the Program.

The Pretreatment Program is designed to prevent toxic pollutants from being discharged to POTWs through controls on the sources that discharge these pollutants. Thus, pollution prevention may be considered an extension of current pretreatment program implementation activities.

For example, Pretreatment Programs have the authority to require and enforce waste management practices in order to meet NPDES permit requirements and eliminate interference with treatment facilities.

Requiring slug control plans and developing compliance schedules for improved operation and maintenance (**O&M**) procedures are examples of pollution prevention activities that have long been required by many Control Authorities. Other pretreatment program implementation tools available to make pollution prevention a more integral part of a pretreatment program include:

Inspections - Pretreatment personnel are usually quite familiar with processes performed at their local industrial facilities and have exposure to a variety of industries performing the same or similar processes; therefore, they can easily disseminate (non-confidential) information about actual pollution prevention measures implemented as well as identify new P2 opportunities.

Permits - Where local regulations allow, questions about pollution prevention measures and plans can be made part of the permit application process. Also, a permittee may be required to undergo a pollution prevention assessment and/or develop a pollution prevention plan as a condition of the permit.

Local limits - POTWs near or above maximum allowable headworks loadings may institute POTW wide-pollution prevention programs to reduce specific pollutants.

Enforcement negotiations - A pollution prevention audit may be required through a consent or compliance order, or implementation of pollution prevention measures may be required as part of a settlement.

Several Control Authorities have implemented these pollution prevention activities. For example, the City of Palo Alto, CA established a silver local limit for photoprocessors and Best Management Practices (**BMPs**) for automotive facilities. To reduce mercury loadings from dental offices, Western Lake Superior Sanitary Sewer District (**WLSSD**) in Duluth, MN developed and implemented pollution prevention BMPs.

These and many other POTWs that have successfully integrated pollution prevention into their pretreatment programs have become recognized environmental leaders in their communities.

While pollution prevention activities can be unique to each POTW, the following are key elements of successful pollution prevention programs:

Integrate pollution prevention into existing activities - POTWs that view pollution prevention as an enhancement (instead of an additional requirement) to their existing pretreatment programs make small modifications to existing pretreatment activities efficiently and effectively.

Start Small - POTWs that slowly phase in new pollution prevention activities overcome impediments such as limited resources and resistance.

- Decrease pollutant loadings to POTW that result in lower O&M costs and reduce or eliminate need for capital expenditures for POTW treatment plant expansions
- Enables continued or expanded growth in the community without harm to the environment.

Figure 34. Benefits of Pollution Prevention to POTWs
This approach enables pollution prevention activities to become an accepted integral part of the pretreatment program.

Define attainable goals and measure success - Short-term, narrowly focused efforts have a greater chance of succeeding. For example, POTWs have targeted a specific pollutant and group of industries, established specific pollution prevention activities, and monitored the progress and success of these activities. With each new success recorded, the benefits of pollution prevention are illustrated and the demand for further activities will grow.

Provide incentives - Incentives are effective tools for persuading users to investigate pollution prevention opportunities. POTWs have used a wide range of tools such as public recognition of pollution prevention achievements and reduction of regulatory requirements.

Benefits of Pollution Prevention

For both IUs and POTWs, pollution prevention has many benefits (Figures 34 and 35) that can be broadly categorized under tangible economic rewards and public goodwill and support. For example, pollution prevention:

- Creates cost savings
- Enhances process efficiency
- Avoids or reduces regulatory costs
- Reduces future liabilities
- Improves protection of worker health
- Improves public image.

Paint separation and battery collection

P2 Implementation

Although the numerous benefits make pursuing pollution prevention attractive, implementation of source reduction in some situations may not be possible. Before implementing a pollution prevention practice, the benefits and barriers of the potential opportunity must be evaluated.

Household Hazardous Wastes or Products: paints, cleaning supplies, solvents and other products.

Figure 35. Benefits of Pollution Prevention to IUs

Common impediments include the following:

Technology

- Decrease product quality.
- Unable to change raw materials because of currently available technology.

Financial

- Incur high costs associated with implementing alternatives (i.e., new equipment or materials, or personnel and training).
- Loss due to downtime during switch overs and start ups.
- Foreign competitors may have an economic advantage if they are not obligated to comply with US regulations.
- Binding contracts with existing waste haulers and Treatment, Storage and Disposal (**TSD**) facilities may exist.

Organizational

- Lack of or poor communication between persons possessing the knowledge and ideas for improvements and those that can actually implement the changes.
- Limited personnel or internal resources available to investigate and/or make changes.
- Lack of coordination and cooperation among divisions in the corporation.

Behavioral

- Alternatives may be considered inconvenient by personnel (e.g., dry sweeping then a wet wash down as opposed to just a wet wash down).

Regulatory

- Elimination of regulated wastewater discharges, and hence, monitoring requirements.
- Reduced paperwork requirements for waste hauling and treatment.
- Compliance with RCRA reports on waste reduction (i.e., companies generating RCRA wastes are required to certify that they have a program to reduce the volume and toxicity of hazardous waste generated).
- Compliance with land disposal restrictions and bans.

Environmental

- Minimization of material emissions to all media resulting in reduced health risks to workers and the community.

Financial

- Reduced landfill and treatment costs due to less waste being generated (includes reduced transportation costs as well).
- Reduced raw material and manufacturing costs (e.g., by preventing spills or leaks, improving equipment maintenance and inventory control techniques, reuse, etc. raw materials are handled more efficiently and do not have the chance to become waste. With a greater percentage of raw material going into process, raw material use goes down in relation to volume of product produced).
- Increased manufacturing efficiency and productivity and improved product quality with fewer offspec products.

Compliance and public relations

- Achieving compliance with local limits and categorical standards.
- Reducing waste and implementing best management practices can improve public and community relations.

Regulatory

- Concentrating a pollutant for recycling may classify it as a hazardous waste (e.g., silver). As such, an industrial user may choose to discharge the pollutant rather than be subject to regulations regarding the handling, treatment and disposal of a hazardous waste.

Pollution Prevention Assistance

With the creation of the PPA came an abundance of pollution prevention related assistance. This includes direct technical assistance, training courses, and a variety of publications.

POTWs can find further information on integrating pollution prevention into their pretreatment programs in the EPA's 1993 *Guides to Pollution Prevention - Municipal Pretreatment Program*s. Specific industry trade associations and university technology transfer and outreach departments are usually aware of pollution prevention assistance materials, specific pollution prevention opportunities, and the costs and success of implementing these.

Some further sources that disseminate pollution prevention information include:

Pollution Prevention Information Clearinghouse (PPIC) - a free, nonregulatory clearinghouse available to the public which focuses on source reduction and recycling for industrial toxic wastes.

State Programs - provide technical assistance to conduct pollution prevention assessments, develop guidance manuals on conducting these assessments, actually conduct these assessments, provide assistance in developing POTW-wide pollution prevention plans, provide training for industry, State and POTW personnel, and offer grants for pollution prevention projects.

Envirosense - an on-line computer system *(internet address:* ***es.inel.gov***) of summary information for PPIC documents, includes pollution prevention news, upcoming events, and mini-exchanges (discrete pollution prevention topic areas, pollution prevention databases, and message centers).

National Institute of Standards and Technology (NIST) - an office of the Department of Commerce, NIST develops technology to improve product quality, modernize manufacturing processes, ensure product reliability, and facilitate rapid commercialization of products based on new scientific discoveries.

NIST web sites for different industry sectors are available. For example, the metal finishing web site (i.e., the National Metal Finishing Resource Center) is found at www.nmfrc.org.

How would you dispose of used oil filters?

Other Related Subjects

- **Ordinance Example**
- **Grease Removal**
- **Combined Sewer Overflow (CSOs)**
- **Stormwater**
- **Concentrated Animal Feeding Operations CAFO**

Toilet retrofit program are a part of pollution prevention program. Most cities are changing high water use toilets to low water use toilets 1.6 gallons to conserve water and the other big water conservation device is no-flush or waterless urinals.

Pretreatment Ordinance Example

SECTION 10.400: PRETREATMENT PROGRAM

This section adopts by reference, the applicable regulations of Title 40 Code of Federal Regulations, Part 403, "General Pretreatment Regulations for Existing and New Sources of Pollution," and other applicable State and Federal laws, including but not limited to, the Clean Water Act. These regulations are herein referred to as General Pretreatment regulations.

10.401 PURPOSE AND APPLICABILITY

(1) Purpose

This section forms the basis of the City of Sunflower pretreatment program to regulate non-domestic discharges to its sewage collection and treatment facilities. Regulation of such discharges is necessary to prevent interference with the operation of the facilities, to prevent pass-through of the treatment facilities, and to prevent any other condition which would be incompatible with the facilities.

(2) Applicability

This section shall be applicable to all non-domestic dischargers to the City's POTW.

10.402 DEFINITIONS

(1) The following words and phrases shall have the meanings herein:

Act or "the Act" means the Federal Water Pollution Control Act, also known as the Clean Water Act, 33 U.S.C. Section 1251 et.seq.

Approval Authority means the Regional Administrator of the United States Environmental Protection Agency.

Approved Test Procedures means those procedures found at Title 40 Code of Federal Regulations, Part 136 and those alternate procedures approved by the Administrator of the United States Environmental Protection Agency under the provisions of Title 40.

Authorized Representative of User means a duly authorized representative of a user in accordance with the General Pretreatment Regulations.

BOD (biochemical oxygen demand) means the oxygen required for the biochemical degradation of organic material in five (5) days at twenty degrees Celsius (20'C), expressed in milligrams per liter (mg/L), as determined by approved test procedures.

Categorical User means a user that is subject to the National Categorical Standards.

City means the City of Sunflower, Texas or any authorized person acting in its behalf.

Cooling Water means the water discharged from any system of condensation, such as air conditioning, cooling, and refrigeration systems.

COD (chemical oxygen demand) means the measure of the oxygen equivalent of the organic matter content that is susceptible to oxidation by a strong chemical oxidant, expressed in mg/L as determined by approved test procedures.

Composite sample means a sample resulting from the combination of individual aliquots taken at equal intervals based on increments of time, flow or both.

Control Authority means the City Manager, Director of Public Works or a duly authorized representative.

Control Point means point of access to a user's sewer where sewage monitoring can be done.

Dilution means the addition of any material, either liquid or nonliquid, or any other method to attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the national categorical standards or local limits set by this section.

Director means the City of Sunflower Director of Public Works or his authorized representative unless otherwise specified.

Domestic Sewage means water-borne materials normally discharged from sanitary conveniences of dwellings, including apartment houses and hotels, office buildings, factories and institutions, free from storm water, utility and process discharges. Normal domestic sewage means normal sewage for Sunflower, Texas, in which the average daily concentration of biochemical oxygen demand (BOD) and total suspended solids (TSS) are established at two hundred-fifty (250) mg/L each, on the basis of the normal contribution of twenty-hundredths (0.20) pounds per capita per day each, and in which the average daily concentration of chemical oxygen demand (COD) is established at four hundred-fifty (450) mg/L. It is further expressly provided that for the purpose of this section, any discharge that exceeds the above concentration of BOD, TSS or COD shall be classified as non-domestic and made subject to all regulations pertaining thereto, whether or not such discharge was partially of domestic origin.

Environmental Protection Agency (EPA) means the U.S. Environmental Agency, or where, appropriate, The Regional Water Management Division director, or other duly authorized official of said agency.

Existing Source means any source of discharge, the construction or operation of which commenced prior to the publication by EPA of proposed categorical pretreatment standards, which will be applicable to such source if the standard is thereafter promulgated in accordance with Section 307 of the Act.

General Pretreatment Regulations means Title 40 Code of Federal Regulations, Part 403, "General Pretreatment Regulations for Existing and New Sources of Pollution."

Grab sample means an individual sample collected without regard to flow in a time not to exceed fifteen minutes.

Headworks means the location where raw (untreated) sewage is introduced into the sewage treatment facilities.

Interference is as defined in the General Pretreatment Regulations.

Maximum Allowable Discharge Limit means maximum concentration of a pollutant allowed to be discharged at any time, determined from the analysis of any discrete or composite sample collected, independent of the industrial flow rate and the duration of the sampling event.

Monthly Average Limit means a discharge limit based on the average of the analytical results of all samples for a parameter taken during a calendar month using approved methods for both sampling and analysis.

National Categorical Standards means the pretreatment regulations of Title 40 of the Code of Federal Regulations, Chapter I, Subchapter N, "EPA Effluent Guidelines and Standards."

New Source shall mean the following:

(1) Any building, structure, facility or installation from which there is or may be a discharge of pollutants, the construction of which commenced after the publication of proposed Pretreatment Standards under Section 307(c) of the Act which will be applicable to such source if such standards are thereafter promulgated in accordance with that section, provided that:

(a) The building, structure, facility or installation is constructed at a site which no other source is located; or

(b) The building, structure, facility or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or

(c) The production or wastewater generating processes of the building, structure, facility or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant, and the extent to which the new facility is engaged in the same general type of activity as the existing source should be considered.

(2) Construction on a site at which an existing source is located results in a modification rather than a new source if the construction does not create a new building, structure, facility or installation meeting the criteria of Title 40 CFR 403.3(k)(1)(ii) and Title 40 CFR 403.3(k)(1)(iii) but otherwise alters, replaces, or adds to existing process or production equipment.

(3) Construction of a new source as defined herein has commenced if the owner or operator has:

(1) Begun, or caused to begin as part of a continuous onsite construction program any placement, assembly, or installation of facilities or equipment; or significant site preparation work including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment; or

(2) Entered into a binding contractual obligation for the purchase of facilities or equipment which are intended to be used in its operation within a reasonable time. Options to purchase or contracts which

can be terminated or modified without substantial loss and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation.

Noncontact cooling water means water used for cooling that does not come into direct contact with any raw material, intermediate product, waste product, or finished product.

Noncategorical User means a user that is not subject to the national categorical standards.

Non-domestic Sewage means a discharge to the POTW that is not domestic sewage.

Nonprocess flows means sewage that is not classified as domestic or process, such as noncontact cooling water, cooling tower blowdown, air conditioner condensates, and demineralizer blowdown.

Outfall means a discharge of sewage that is expressly identified by the Control Authority for control and monitoring purposes.

Overload means the imposition of mass or hydraulic loading on a treatment facility in excess of its engineered design capacity.

Pass-through means a discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges form other sources, is a cause of a violation of any requirement of the City of Sunflower NPDES permits, including an increase in the magnitude or duration of a violation.

Person means any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, estate, governmental entity, or any other legal entity; or their legal representatives, agents, or assigns. This definition includes all Federal, State and local governmental entities.

pH means the logarithm (base 10) of the reciprocal of the hydrogen ion concentration.

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash sewage, garbage, sewage sludge, munitions, medical wastes, chemical wastes biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, municipal, agricultural and industrial wastes, and certain characteristics of wastewater (e.g., pH, temperature, TSS, turbidity, color, BOD, COD, toxicity, or odor).

POTW (Publicly Owned Treatment Works) means the sewage treatment works owned by the City of Sunflower. This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of sewage. It includes sewers, pipes, and other conveyances only if they convey sewage the City of Sunflower POTW.

Pretreatment means the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. The reduction or alteration may be obtained by physical, chemical or biological processes, process changes or by other means, except as prohibited by 40 CFR 403.6(d).

Pretreatment Requirements means all of the requirements that are set forth in this ordinance.

Process Flow means sewage that is generated during manufacturing or processing, which comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product.

Removal is as defined in the General Pretreatment Regulations.

Sewage means solids, liquids, or gaseous materials discharged to the City's POTW. Sewage includes both domestic and non-domestic sewage.

Sewer (sanitary sewer) means an artificial pipe or channel that carries sewage and to which storm water and ground water are not intentionally admitted.

Significant User means a user that is: (1) subject to national categorical standards; (2) discharges an average of twenty-five thousand (25,000) gallons per day (gpd) or more of process flow to the POTW; (3) discharges of process flow which makes up five (5) percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant, or; (4) has a reasonable potential, in the opinion of the Control Authority, to adversely affect the POTW treatment plant.

Slug Load means any discharge at a flow rate or concentration which could cause a violation of the prohibited discharge standards stated herein.

Standard Industrial Classification (SIC) means a classification pursuant to the Standard Industrial Classification Manual issued by the Office of Management and Budget.

Storm Water means any flow occurring during or following any form of natural precipitation, and resulting from such precipitation, including snowmelt.
Surcharge means the additional wastewater service charge incurred by any user discharging waste containing higher concentrations of BOD, TSS and COD than those defined for domestic sewage herein.
To Discharge includes to deposit, conduct, drain, emit, throw, run, allow to seep, or otherwise release or dispose of, or to allow, permit or suffer any of these acts.
TSS (total suspended solids, nonfilterable residue) means solids that either float on the surface or are in suspension, measure at one hundred-three to one hundred-five degrees Celsius (103-105'C), expressed in mg/L, as determined by approved test procedures.
User means a discharger of any non-domestic sewage to the POTW. A user includes, but is not limited to, any individual, firm, company, partnership, corporation, group, association, organization, agency, city, county, or district.

1. The meaning of all terms used in this ordinance that are not defined above shall be as defined in Title 40, Code of Federal Regulations.

10.403 PRETREATMENT STANDARDS

There are three types of pretreatment standards: prohibited discharge standards - including general, specific, and dilution prohibitions; national categorical standards; and local limits. These standards shall apply to a user whether or not the user is subject to other federal, state, or local requirements.
The standards in this subsection shall apply to each user, as applicable. Users in an industrial manufacturing category specified in Title 40 of the Code of Federal Regulations Chapter I, Subchapter N, "EPA Effluent Guidelines and Standards,: shall be subject to prohibited discharge standards, national categorical standards, and local limits. Other users shall be subject to prohibited discharge standards and local limits. Where these standards overlap, the most stringent standard shall apply to the user.
The Control Authority, at his discretion, has the right to apply these standards to individual non-domestic discharges before they are commingled.
(1) Prohibited Discharge Standards
(a) General Prohibitions
A user may not discharge to the POTW any material which causes pass-through or interference.
(b) Specific Prohibitions
The following shall not be discharged to the POTW:
(i)Discharges which are capable of creating a fire or explosion hazard in the POTW. These discharges include, but are not limited to, discharges with a closed cup flashpoint of less than one hundred forty degrees Fahrenheit (140'F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in ASTM (American Society for Testing and Materials) standard D-93-79 or D-93-80K or a Seta flash Closed Cup Tester, using the test method specified in ASTM standard D-3278-78;
(ii)Discharges which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.5 or greater than 9.5;
(iii) Discharges containing solid or viscous materials in amounts which will cause obstruction to the flow in or proper operation of the POTW resulting in interference. Discharges shall not contain any materials such as wax, grease, oil, or plastics that will solidify or become discernibly viscous at temperatures between thirty-two and one hundred-fifty degrees Fahrenheit (32-150'F). Discharges shall not contain petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through. Discharges shall not contain any materials such as ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, whole blood, paunch manure, hair and fleshings, entrails, lime slurry, lime residues, slops, chemical residues, paint residues or bulk solids in such quantities capable of causing interference with the POTW. Discharges shall not contain free or emulsified oil and grease in combination exceeding one hundred (100) mg/L;
(iv) Discharges having a temperature higher than one hundred-fifty degrees Fahrenheit (150'F) (sixty-five degrees Celsius, 65'C), or any discharge which contains heat in amounts which will inhibit biological activity or cause interference with the POTW, but in no case heat in such quantities that the

temperature at the headworks of the POTW exceeds one hundred-four degrees Fahrenheit (104'F) (forty degrees Celsius, 40'C);
(v) Discharges that contain any noxious or malodorous materials which can form a gas, which either singly or by interaction with other discharges, are capable of causing objectionable odors; or hazard to life; or creates any other condition deleterious to the POTW; or requires unusual provisions, attention, or expense to handle;

(vi) Discharges which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute workers health and safety problems;
(vii) Discharges that are capable of causing excessive discoloration in the POTW effluent;
(viii)Discharges with unusual flow and concentration, including those with oxygen demanding materials, at a flow rate or concentration which will cause interference with the POTW, or if such materials can cause damage to collection facilities, impair the treatment processes, incur excessive treatment cost, or cause the City to be noncompliant with the conditions of its discharge permits;

(ix) Discharges containing a BOD (biochemical oxygen demand) or TSS (total suspended solids) concentration in excess of 7,000 mg/L;
(x) Discharges classified by the Texas Natural Resource Conservation Commission as hazardous waste at 31 TAC (Texas Administrative Code) Chapter 335 without the written approval of the Control Authority;
(xi) Discharges containing radioactive materials without the written approval of the Control Authority;

(xii) Materials that are trucked or hauled in, except at discharge points that are designated by the Control Authority; or
(xiii) Discharges from steam cleaning and chemical cleaning businesses unless a facility or process is provided that will produce an effluent compliant applicable Pretreatment Requirements. There shall be no discharge of visible foam.

(c) Dilution Prohibitions
(i) No user shall ever add any material, either liquid or nonliquid, or in any other way attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the national categorical standards or local limits.
(ii) This prohibition does not include dilution which is a normal part of the production process or a necessary part of the process to treat a waste, such as adding lime for neutralization or precipitation, or the mixture of compatible wastes in order to treat at capacity levels rather than treating wastes in small batches.
(iii) The Control Authority, at his discretion, may impose mass limitations on a user that is using dilution to meet applicable pretreatment standards or requirements, or in cases where the imposition of mass limitations is appropriate.
(2) National Categorical Standards
National Categorical standards apply to specific industrial subcategories under Title 40 of the Code of Federal Regulations, Chapter I, Subchapter N, "EPA Effluent Guidelines and Standards." A user that falls into one of these subcategories shall be subject to the pretreatment standards applicable to that subcategory and is classified as a categorical user.

(3) Local Limits
Local limits are quantitative limits on discharges applicable to all users. Local limits are designed to meet the general and specific prohibitions in 10.403(1)(a) and (b) of this ordinance.

(a) Existing Local Limits

Local limits are periodically reviewed by the Control Authority and revised as necessary to respond to changes in federal, state, or local regulations, environmental protection criteria, plant design and operational criteria, and the nature of industrial discharges to the POTW. Local limits are as follows:

Constituent*	Maximum Allowable Concentration in a Daily Composite, mg/L
Cadmium	0.2
Chloroform	4
Chromium (total)	17
Copper	3.5
Ethyl benzene	16
Lead	0.5
Naphthalene	15
Nickel	4.5
Silver	0.07
Tetrachloroethylene(perchloroethylene)	5
Toluene	14
Zinc	3.8
	***limits for metals based on unfiltered samples**

(b) Case-by case Local Limits

Local limits that have not yet been established for a material may be developed on a case-by-case, user specific basis. A user must have the case-by-case local limit(s) included in a permit before discharging to the POTW.

10.404 SIGNIFICANT USERS

(1) Option to Exclude Noncategorical Users

The Control Authority need not list as significant any noncategorical user that, in the opinion of the Control Authority, has no potential for adversely affecting the POTW's operation or for violating any of the Pretreatment Requirements.

(2) Delisting of Noncategorical Users

Any noncategorical user that has been listed as a significant user may petition the Control Authority to be removed from the significant user list and reclassified as nonsignificant on the grounds that it has no potential for adversely affecting the POTW's operation or for violating any of the Pretreatment Requirements.

(3) Notification Requirements

If a noncategorical user has been listed as a significant user by the control Authority for whatever reason, prior to removal from the list, the control Authority will notify the Approval Authority.

10.405 Discharge Permits

(1) Applicability

All users shall obtain a permit from the Control Authority in order to discharge non-domestic sewage to the City's POTW. Permit applications shall be submitted to the Control Authority prior to permit issuance. Either the owner or operator of a user's facility shall submit the application.

(2) Denial or Condition of Permit

The Control Authority has the right to deny or condition a permit for any non-domestic discharges that do not meet the Pretreatment Requirements or would cause the City to be noncompliant with the conditions of the City's discharge permits.

(3) Permit Conditions
(a) Minimum Conditions
The permit will contain the following minimum conditions:
(i) Period during which the permit is effective, in no case greater than five years;
(ii) Transferability of the permit to a new owner or operator allowable only with notification and approval of Control Authority;
(iii) Limits on the volume and quality of sewage discharged based on the Pretreatment Standards;
(iv) Requirements for self-monitoring programs such as location, type, and frequency of sampling, measurement, and analysis; and
(v) Requirements for notifications, reports, and recordkeeping.
(vi) A statement of applicable civil and criminal penalties for violation of pretreatment standards and requirements, and any applicable compliance schedule. Such schedules may not extend the compliance date beyond applicable federal deadlines.
(b) Other Conditions
The following conditions, as applicable, will be in the permit:
(i) Conditions and compliance schedule necessary to achieve compliance with the Pretreatment Requirements.
(ii) Plans to prevent and control spills and batch discharges;
(iii) Any other conditions necessary to ensure compliance with the Pretreatment Requirements, and other federal, state and local requirements, and;
(vi) A statement requiring that all reports contain the certification statement at 40 CFR 403.6(a)(2).
(4) Permit Application Form
Applications for new permits, permit renewals, and permit modifications shall be made on a standard form provided by the Control Authority. Applications shall be submitted to the Control Authority.
(5) Existing Users
Significant users with existing non-domestic discharges prior to March 14, 1990, shall submit a permit application before September 15, 1990. Other users with existing non-domestic discharges prior to March 14, 1990 shall submit a permit application before June 15, 1990. Existing users shall be allowed to discharge non-domestic sewage without a permit until the Control Authority has issued the user a permit, if the user has submitted a permit application with the applicable time period.
(6) New Users
A new user shall submit a permit application and obtain a permit before discharging to the POTW. An application shall be submitted by significant users at least one hundred eighty (180) days before the date the discharge will begin. It is recommended that an application be submitted by other user at least ninety (90) days before the date the discharge will begin.
(7) Discharge and Permit Modifications
If a user with a discharge permit wishes to add or change a process or operation which would change the nature or increase the quantities of materials discharged to the POTW such that the user would be noncompliant with the user's permit requirements or the Pretreatment Requirements, the user shall obtain approval by the Control Authority prior to making these additions or changes to the discharge. Approval shall be given by the Control Authority by a modification, or revocation and re-issuance of the permit. A significant user shall submit an application for permit modification at least one hundred eighty (180) days before the date the change in discharge is expected to begin. It is recommended that an application be submitted by other users at least ninety (90) days before the date the change in discharge is expected to begin.
(8) Permit Renewal
A permit may have a period of duration up to five (5) years. A permit shall be renewed by submitting an application for renewal. An application shall be submitted by significant users at least one hundred eighty (180) days before the expiration date of the existing permit. An application for other users shall be submitted at least ninety (90) days before the expiration date of the existing permit.
(9) Re-opening of Permit
The Control Authority has the right to re-open a permit before its expiration date to include compliance schedules, or to achieve compliance with new or revised Pretreatment Requirements, federal, state, or local requirements.

(10) Changes in Owner or Operator

(a) Transfer of Permit

A permit shall only be transferred to a new owner or operator if the following conditions are met. The expiration date of the permit is not extended by the transfer. The control Authority will send to the owner or operator a revision to the permit to reflect the change in owner or operator.

(i) The nature of the discharge or operation of the facility will not change under the new owner or operator;

(ii) The current owner or operator notifies the Control Authority at least thirty (30) days in advance of the proposed transfer date;

(iii) The notification includes a written agreement between the current and new owner or operator continuing a specific date for transfer of permit responsibility, coverage, and liability between them; and

(iv) The Control Authority does not notify the current and new owner or operator of the Control Authority's intent to revoke and reissue the permit. If the Control Authority does not notify, the transfer is effective on the date specified in the written agreement.

(b) Revocation and Re-issuance of Permit

If above conditions in paragraph (a) are not met, the Control Authority shall require the new owner or operator to submit a permit application as a new user and obtain a permit before discharging to the POTW. In addition, the current owner or operator shall notify the Control Authority at least thirty (30) days in advance of the proposed date on which the ownership will change.

10.406 REMOVAL CREDITS

(1) The Control Authority may, at his discretion, grant removal credits to a categorical user to reflect removal by the POTW of materials specified in the national categorical standards. The Control Authority may grant a removal credit equal to or, at his discretion, less than the POTW's consistent removal rate. Removal credits may only be given for indicator or surrogate materials regulated in a national categorical standard if the standard so specifies.

(2) A user shall submit a removal credit application to the Control Authority. Written approval by the Control Authority shall be obtained prior to taking the removal credit. Application shall be made on a standard form provided by the Control Authority.

(3) The Control Authority has the right to grant removal credits only after meeting the requirements of the General Pretreatment Regulations.

10.407 NOTIFICATION REQUIREMENTS

Notification to the Control Authority is required for any of the following. The timing, content, and form of notification are established either in the discharge application or discharge permit, as applicable.

(1) A condition or event that would cause pass-through of or interference with the POTW, including slug loadings as defined by 10.402 and 10.403 herein.

(2) Permit noncompliance.

(3) Bypasses and upsets.

(4) A change in pretreatment processes.

(5) A change in monitoring facilities such as location and type of equipment.

(6) Discharges of hazardous waste.

(7) Discharges containing radioactive materials.

(8) Other appropriate conditions or events to ensure compliance with the Pretreatment Requirements, and other federal, state, or local requirements.

10.408 REPORTING REQUIREMENTS

(1) Baseline Report

Categorical users shall submit baseline reports in accordance with the General Pretreatment Regulations.

(a) Within either one hundred eighty (180) days after the effective date of the categorical pretreatment standard, or the final administrative decision on a category determination under 40 CFR 403.6(a)(4), whichever is later, existing categorical users currently discharging to or scheduled to discharge to the POTW shall submit to the Control Authority a report which contains the information listed in paragraph (b) below. At least ninety days prior to commencement of their discharge, new sources, and sources that become categorical users subsequent to the promulgation of an applicable categorical standard, shall submit to the Control Authority a report which contains the information listed in paragraph (b) below. A new source shall report the method of pretreatment it intends to use to meet applicable categorical standards. A new source also shall give estimates of its anticipated flow and quantity of pollutants to be discharged.

(b) Users described above shall submit the following:

(i) Identifying Information - The name and address of the facility, including the name of the operator and owner.

(ii) Environmental Permits - A list of any environmental control permits held by or for the facility.

(iii)Descriptions of Operations - A brief description of the nature, average rate of production, and standard industrial classifications of the operation(s) carried out by such user. This description should include a schematic process diagram which indicates points of discharge to the POTW from the regulated processes.

(iv) Flow Measurement - Information showing the measured average daily and maximum daily flow, in gallons per day, to the POTW from regulated process streams and other streams, as necessary, to allow use to the combined wastestream formula.

(v) Measurement of Pollutants - The categorical pretreatment standards applicable to each regulated process. The results of sampling and analysis identifying the nature and concentration, and/or mass, where required by the standard or by the Control Authority, of regulated pollutants in the discharge from each regulated process. Instantaneous, daily maximum, and long-term average concentrations, or mass, where required, shall be reported. The sample shall be representative of daily operations and shall be collected and analyzed in accordance with procedures set out in 40 CFR 136.

(vi) Signature and Certification - All baseline monitoring reports must be signed and certified in accordance with 40 CFR 403.6 (a)(2).

(2) Compliance Schedule Progress Reports

(a) Should additional pretreatment or operation and maintenance be required to meet pretreatment standards, a compliance schedule will be issued. The schedule shall contain progress increments in the form of dates for the commencement and completion of major events leading to the construction and operation of additional pretreatment facilities required for the user to meet the applicable pretreatment requirements.

(b) No increment shall exceed nine months;

(c) The user shall submit a progress report to the Control Authority no later than fourteen days following each date in the schedule and the final date of compliance. This report shall include as a minimum, whether or not the user complied with the progress increments, reasons for any delays, and steps being taken y the user to return to the established schedule;

(3) <u>Reports on Compliance with Categorical Pretreatment Standard Deadline</u>

Within ninety days following the date for final compliance with applicable categorical pretreatment standards, or in the case of a new source following commencement of the introduction of wastewater into the POTW, any user subject to such pretreatment standards and requirements shall submit to the Control Authority a report containing the information described in 10.408(1)(b) herein. For users subject to equivalent mass or concentration limits established in accordance with 40 CFR 403.6(c), this report shall contain a reasonable measure of the user's long-term production rate. For all other users subject to categorical pretreatment standards expressed in terms of allowable pollutant discharge per unit of production this report shall include the user's actual production during the appropriate sampling period. All compliance reports must be signed and certified in accordance with 40 CFR 403.6(a)(2). Categorical users shall submit reports in accordance with the General Pretreatment Regulations on compliance schedule progress, compliance with categorical pretreatment standard deadlines, and continued compliance with categorical pretreatment standards.

(4) <u>Periodic Reports on Continued Compliance</u>

(a) All significant industrial users shall, at a frequency determined by the Control Authority but in no case less than twice per year, submit a report indicating the nature and concentration of pollutants and the estimated or measured daily maximum and average flows of the discharges to which pretreatment requirements are applicable. All periodic reports must be signed and certified in accordance with 40 CFR 403.6(a)(2).

(b) The Control Authority may require all other users and/or persons discharging non-domestic wastewater into the POTW to submit appropriate reports concerning the nature and concentration of pollutants in the discharge.

(5) <u>Reports of Additional Samples Taken</u>

If a user subject to pretreatment requirements monitors any pollutant more frequently than required using approved test procedures, the results of this monitoring shall be included in the periodic reports.

(6) <u>Repeat Sampling and Reporting</u>

If sampling performed by a user indicates a violation, the user must notify the Control Authority with twenty-four (24) hours of becoming aware of the violation. The user shall also repeat the sampling and analysis and submit the results of the repeat analysis to the Control Authority within thirty (30) days after becoming aware of the violation.

(7) <u>Sample Collection and Monitoring Requirements</u>

All sampling techniques and pollutant analyses used for compilation of data required to be submitted as part of a wastewater discharge application or report required by any pretreatment requirement shall be performed in accordance with the techniques prescribed in Title 40, Code of Federal Regulations, Part 136 unless otherwise specified in an applicable categorical pretreatment standard.

(8) <u>Additional Reports</u>

The Control Authority has the right to request any additional reports from a user that are necessary to assess and assure compliance with the Pretreatment Requirements.

(9) Record Keeping

(a) Users subject to the reporting requirements of this ordinance shall retain, and make available for inspection and copying, all records of information obtained pursuant to any monitoring activities required by this ordinance and additional records obtained pursuant to monitoring activities undertaken by the user independent of such requirements.

(b) Records shall include the date, exact place, method, and time of the sampling and the name of the person(s) taking the sample; dates analyses were performed; who performed the analyses; the analytical techniques or methods used; and the results of the analyses.

(c) Records shall remain available for a period of at least three (3) years. This period shall be automatically extended for the duration of any litigation concerning the user of the Control Authority, or where the user has been specifically notified of a linger retention period by the Control Authority.

10.409 PRETREATMENT FACILITIES

Users shall provide pretreatment facilities if they are necessary in order to comply with the pretreatment standards in 10.403 of this ordinance.

(1) Approval of Proposed Pretreatment Facilities

Plans, specifications, and any other pertinent information related to proposed pretreatment facilities for significant users shall be submitted to the Control Authority. Other users may be requested by the Control Authority to submit plans, specifications, and any other pertinent information related to proposed pretreatment facilities. Construction of such facilities prior to acceptance by the Control Authority may be done solely at the risk of the user. This acceptance shall in no way relieve the user of the obligation to install, operate, maintain and, if necessary, modify the pretreatment facilities to maintain compliance with the Pretreatment Requirements. Pretreatment facilities shall be constructed so as to provide the following:

(a) Prevention of prohibited discharges form entering a sewer;

(b) Control of the quantities and rates of discharge of non-domestic sewage into a sewer; and

(c) An accessible entry so that any authorized employee of the City may readily and safely inspect and monitor the non-domestic discharges.

(2) Pretreatment Facilities To Be Maintained

Pretreatment facilities shall be maintained in satisfactory and effective operation by the user at the user's expense. Operation and maintenance records shall be maintained by the user as specified in the user's discharge permit.

(3) Accidental Discharge/Slug Control Plans

Users discharging non-domestic wastewater into the POTW shall provide protection from the accidental discharge of prohibited wastes. Prior to the commencement of any non-domestic discharge and at least once every two years the Control Authority shall evaluate whether each significant user requires an accidental discharge/slug control plan. The Director may require any user to develop, submit for approval, and implement such a plan. Alternatively, the Director may develop such a plan for any user. Each plan shall include the following as a minimum:

(a) Description of discharge practices, including non-routine batch discharges;

(b) Description of stored chemicals;

(c) Procedures for immediately notifying the Director of any accidental or slug discharge, as required by section 10.407 of this ordinance.

(d) Procedures to prevent adverse impact from any accidental or slug discharge. Such procedures include, but are not limited to, inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants, measures and equipment for emergency response and any other procedures deemed necessary to prevent accidental/slug discharges from entering the POTW.

(4) Additional Pretreatment Measures

(a) Whenever deemed necessary, the Control Authority may require user to restrict their discharge during peak flow periods, designate that certain wastewater be discharged only into specific sewers, relocate and/or consolidate points of discharge, separate sewage wastestreams from industrial wastestreams, and such other conditions as may be necessary to protect the POTW and determine the user's compliance with the requirements of the ordinance.

(b) Grease, oil and sand interceptors shall be provided when deemed necessary by the Control Authority for the proper handling of wastewater containing excessive amounts of grease and oil or sand. Such interceptors shall not be required for residential users. All

interception units shall be of type and capacity approved by the Control Authority and shall be so located to be easily accessible for cleaning an inspection. Such interceptors shall be inspected, cleaned, and repaired regularly, as needed, by the user at their expense.
(c) Users with the potential to discharge flammable substances may be required to install and maintain an approved combustible gas detection meter.

10.410 INSPECTION, SURVEILLANCE, AND MONITORING
(1) Minimum Monitoring Requirements
(a) Significant users shall be required to self-monitor to meet, at a minimum, the requirements of the General Pretreatment Regulations.
(b) Users that have the potential to routinely discharge non-domestic sewage that contains concentrations of BOD, TSS, and COD higher than those defined for domestic sewage herein shall be independently monitored by the City for flow, BOD, TSS, COD and pH at least once a year. The Control Authority shall determine which users have this potential.
(c) The City shall independently monitor all other users for flow, BOD, TSS, COD, and pH at a frequency in relation to their potential impact on the POTW, as determined by the Control Authority.
(d) The Control Authority may increase the frequency and/or add parameters to a user's self-monitoring program or the City's independent monitoring program to ensure compliance with the Pretreatment Requirements.
(2) Sampling and Analysis
(a) Significant users shall meet the requirements of the General Pretreatment Regulations for sampling and analysis. Other users shall meet the requirements for sampling and analysis as stated herein or in the user's control document.

(b) For all users, containers, preservation techniques, and holding times for samples shall comply with methods and procedures found at Title 40 Code of Federal Regulations, Part 136.
(c) For all users, sample analysis shall be in accordance with approved test procedures. The Control Authority, at this discretion, may specify which approved test procedure shall be used.
(d) Type of samples (grab or composite) and flow measurement shall be consistent with the type of discharge and parameters being regulated and shall be specified by the Control Authority in the permit.
(3) Control Point
A user shall provide a control point for the purpose of sampling and flow measurement. The location and design of the control point shall be approved by the Control Authority. The control point shall be placed so that non-domestic sewage can be sampled and measured prior to any commingling with domestic sewage or non-process flows.

Written approval of exceptions to this requirement shall be obtained by a user form the Control Authority. It is recommended that the control point for sampling and flow measurement be at the same location. Flow may be determined by water supply meter measurements if no other flow device is available and no other source of raw water is used. Other methods for estimating wastewater discharge flow must approved by the Control Authority.

(4) Inspection and Entry
The Control Authority or his duly authorized representative, Federal and State Officials, upon presentation of credentials and other documentation as may be required by law, shall be permitted to gain access to such properties as may be necessary for the purpose of inspection, observation, sampling, set up and use of monitoring equipment, and inspection and copying of records having a direct bearing on the discharges of non-domestic sewage. Unreasonable delays in allowing access to the user's premises shall be a violation of this ordinance.
(5) Use of Contractors
The Control Authority may select an independent contractor to conduct the independent monitoring by the City.

10.411 ENFORCEMENT
(1) Administrative Order
In addition to any other actions or remedies authorized in this ordinance, the Control Authority or its duly authorized representative is authorized to enforce this ordinance through the exercise of any one or more of the following administrative actions. Unless otherwise expressly set forth herein, the selection or use of one such action or remedy by the Control Authority shall not be construed to prevent the Control Authority from pursuing any other enforcement actions or remedies nor require the pursuit of a particular action or remedy as a condition precedent to the use of any other such action or remedy.
(2) Notice of Violation
The Control Authority shall serve a user that is found non-complaint with the Pretreatment Requirements with a notice stating the nature of the noncompliance. This notice may or may not be in writing.
Any violation of pretreatment standards incurs immediate liability. Each day of violation constitutes a separate noncompliance.
Within thirty (30) days after the date of receipt of this notice, a user shall submit a written response to the Control Authority with an explanation of the noncompliance, what steps are currently being taken to prevent the noncompliance, and a plan for the correction and continued prevention of the noncompliance. Submission of this response in no way relieves the user of liability for any violations occurring before or after receipt of the notice of violation.
(3) Consent Order
The Control Authority may enter into Consent Orders, assurances of voluntary compliance, or other similar documents establishing an agreement with any user responsible for noncompliance. Such documents will include specific action to be taken by the user to correct the noncompliance within a time period specified by the document.
(4) Show Cause Hearing
The Control Authority may order a user which has violated or continues to violate, any provision of this ordinance, a wastewater discharge permit or enforcement action issued, or any other pretreatment requirement, to appear the Director and show cause why the proposed enforcement action should not be taken. Notice shall be served on the user specifying the time and place for the meeting, the proposed enforcement action, the reasons for such action, and a request that the user show cause why the proposed enforcement action should not be taken. The notice of the meeting shall be served by hand or certified

mail at least ten days prior to the hearing. Such notice may be served on any authorized representative of the user. A show cause hearing shall not be a bar against, or prerequisite for, taking any other action against the user.

(5) <u>Compliance Order/Compliance Schedules</u>

(a) <u>Applicability</u>

If a user cannot comply with the pretreatment standards in section 10.403 or any other pretreatment requirement, the Control Authority may provide a compliance order containing a schedule for achieving compliance.

(b) <u>Allowable Time for Compliance</u>

The compliance schedule shall be the shortest time in which the user is able to provide pretreatment facilities or changes in operation and maintenance that will achieve compliance. If a user is given a compliance schedule for national categorical standards, the completion date of this schedule shall not be later than the compliance date established for the applicable national categorical standard and shall be in accordance with the General Pretreatment Requirements. A user shall not continue discharging in noncompliance of the Pretreatment Requirements beyond the time limit provided in the compliance schedule.

(c) <u>Form of Compliance Schedule</u>

Compliance schedules may be provided by the Control Authority by notice of noncompliance, enforcement order, or as part of the discharge permit. The Control Authority has the right to re-open a user's discharge permit in order to add a compliance schedule.

(6) <u>Cease and Desist Order</u>

When the Control Authority finds that a user has violated, or continues to violate, any provision of this ordinance, a wastewater discharge permit or order issued herein, or any other pretreatment standard or requirement, or that the user's past violations are likely to recur, the Control Authority may issue an order to the user directing it to cease and desist all such violations and directing the user to:

(a) Immediately comply with all requirements; and

(b) Take such appropriate remedial or preventive actions may be needed to properly address a continuing or threatened violation, including halting operations and/or terminating the discharge.

(7) <u>Authority to Disconnect Service</u>

(a) <u>Conditions for Disconnection</u>

The City shall have the right to disconnect a user's sewer service when a user's discharge reasonable appears to:

(i) Damage sewer lines or POTW treatment processes;

(ii) Cause the City to be noncompliant with the conditions of its discharge permits;

(iii) Present an endangerment to the environment or which threatens to interfere with the operation of the POTW; or

(iv) Present an imminent endangerment to the health or welfare of persons.

(b) <u>Notification</u>

In the case of an imminent endangerment to the health or welfare of persons, the Control Authority shall give oral or written notice to a user before disconnecting sewer service. Under all other conditions for disconnection, the control Authority shall give written notice to a user before disconnection. Within ten (10) days after receipt of notification of disconnection, the user must submit a written response to the Control Authority with an explanation of the cause of the problem and what measures have and will be taken to prevent any future occurrence. Submission of this response in no way relieves the user of liability for any violations occurring before or after receipt of the notice of disconnection.

(c) Reconnection of Service

The user's sewer shall remain disconnected until such time that the user has demonstrated that the cause of this noncompliance has been eliminated.

(d) Liability

The City shall not be liable for any resulting damage to the user's property as a result of disconnection under the conditions for disconnection.

(8) Termination of Permit

A user that violates any of the following conditions may be subject to permit termination:

(a) Failure to report a reasonable estimate of the volume and quality of its non-domestic sewage.

(b) Failure to notify the Control Authority of a change in process or operation which would significantly change the nature or increase the quantities of materials discharged to the POTW that would cause the user to be noncompliant with its discharge permit requirements or the Pretreatment Requirements.

(c) Refusal of right of entry to the user's premises in accordance with Subsection I of this ordinance.

(d) Intentional violation of permit conditions.

(e) Falsifying information.

(f) Failure to pay sewer charges or fines.

(9) Injunctive Relief

The Control Authority may seek injunctive relief to restrain or compel actions of a user.

(10) Civil and Criminal Penalties

The Control Authority has the right to seek or assess civil or criminal penalties in at least the amount of one thousand dollars ($1000) per day for each violation of the user's permit or the Pretreatment Requirements.

10.411.01 Affirmative Defenses to Discharge Violations

(1) Upset

(a) Upset means an exceptional incident in which there is unintentional and temporary noncompliance with pretreatment requirements because of factors beyond the reasonable control of the user. An upset does to include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(b) An upset shall constitute an affirmative defense to an action brought for noncompliance with pretreatment requirements if the following provisions are met.

(c) A user who wishes to establish the affirmative defense of upset shall demonstrate through properly signed contemporaneous operating logs or other relevant evidence that:

(i) An upset occurred and the user can identify the cause(s) of the upset;

(ii) The facility was being operated properly and in compliance with applicable and appropriate operation and maintenance procedures; and

(iii)The user has submitted the following information to the Control Authority within twenty-four (24) hours of becoming aware of the upset:

A description of the nature of the discharge and cause of the noncompliance;
The period of noncompliance, including the exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue;
Steps being taken and/or planned to reduce eliminate, and prevent recurrence of the noncompliance.
(vi) In any enforcement proceeding, the user seeking to establish the occurrence of an upset shall have the burden of proof.
(v) Users will have the opportunity for judicial determination on any claim of upset only in an enforcement action brought for noncompliance with categorical pretreatment standards.
(vi) Users shall control production of all discharges to the extent necessary to maintain compliance with pretreatment requirements upon reduction, loss, or failure of its treatment facility until the facility is restored or an alternative method of treatment is provided.

This requirement applies in the situation where, among other things, the primary source of power for the treatment facility is reduced, lost, or fails.
(2) Bypass
(a) Bypass means the intentional diversion of wastestreams from any portion of a user's treatment facility.
(b) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.
(c) A user may allow any bypass to occur which does not cause pretreatment standards or requirements to be violated, but only if it also is for essential maintenance to assure efficient operation.
(d) If a user knows in advance of the need for a bypass, it shall submit prior notice to the Control Authority at least ten days before the date of the bypass, if possible.
A user shall submit oral notice to the Control Authority of an unanticipated bypass that exceeds applicable pretreatment requirements within twenty-four hours from the time it becomes aware of the bypass. A written submission shall also be provided within five days from the time the user becomes aware of the bypass. The written submission shall contain a description of the bypass and its cause; the duration of the bypass, including exact dates and times, and, if the bypass has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce eliminate, and prevent reoccurrence of the bypass. The Control Authority may waive the written report on a case-by-case basis if proper oral notice has been given.
(e) Bypass is prohibited, and the Control Authority may take an enforcement action against a user for a bypass, unless
(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
(ii) There were no feasible alternatives to the bypass, such as the use auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
(iii)The user submitted notices as stated herein.
(iv) The Control Authority may approve an anticipated bypass, after considering its adverse effects, if the Control Authority determines that it will meet the three conditions in paragraph (e) above.

10.412 FEE SCHEDULE *Example*

(1) Applications

A user is subject to the following application fees:

	Significant Users	Other Users
New Permit	$100	$25
Permit Renewal	$100	$25
Permit Modification	$100	$25

Removal credit - A fixed fee for a removal credit application cannot be given because of the circumstances of each user and constituent the credit is applied for are highly variable. Any user or group of users wishing to apply for a removal credit shall assume responsibility for all costs incurred by the City.

(2) Surcharge for Higher Concentrations

Users shall be assessed a sewer surcharge for non-domestic sewage that contains concentrations of BOD, TSS, and COD higher than those defined for domestic sewage herein. The surcharge shall be in addition to any other sewer charges required by other City ordinances. If a user has more than one non-domestic outfall identified in a permit, the surcharge shall be applicable to the daily average total of all non-domestic discharges and not the individual non-domestic discharges.

(a) When Surcharge Shall Be Applied

A user shall be subject to a surcharge when its non-domestic discharge daily average total:

(i) Exceeds a BOD concentration of two hundred-fifty (250) mg/L;

(ii) Exceeds a total suspended solids concentration of two hundred-fifty (250 mg/; or

(iii) Exceeds a COD concentration of four hundred-fifty (450) mg/L.

(b) Computation of Surcharge

For those users with discharges exceeding a COD concentration of four hundred-fifty (450) mg/L, the surcharge shall be based on COD in lieu of BOD. Computations of surcharges shall be based on the formulas below. The surcharges for individual BOD or COD and

(i) BOD surcharge

S_{BOD} = V x 8.34 (A[BOD - 250])

(ii) TSS surcharge

S_{TSS} = V x 8.34 (B[TSS - 250])

(iii) COD surcharge

S_{COD} = V x 8.34 (C[COD - 450])

where:

S - Sum of surcharges in dollars that will appear on the user's monthly bill.

V - Monthly average volume of non-domestic discharge in millions of gallons whichever is the least of the following volumes: (1) total monthly water consumption during the billing period, (2) the average water consumption for the billing periods of December, January, and February of each fiscal year, or; (3) the total estimated or measured non-domestic discharge as determined by methods specified in the user's permit.

8.34 - Conversion factor for units of measure in surcharge equations.

A - cost per pound of BOD

B - cost per pound of TSS

C - cost per pound of COD

Fees may be found at Chapter 10 Section 10.202 of the City of Sunflower Code of Ordinances 1990 edition.

BOD- BOD concentration in mg/L. For more than one non-domestic discharge, this shall be the flow-weighted concentration.
TSS- total suspended solids concentration mg/L. For more than on non-domestic discharge, this shall be the flow-weighted concentration.
COD- COD concentration in mg/L. For more than one non-domestic discharge, this shall be the flow-weighted concentration.
250- normal daily average BOD and TSS concentration in mg/L.
450- normal daily average COD in mg/L.

(c) Sampling and Analysis

The City shall sample for BOD, TSS, and COD. The time of sampling shall be at the sole discretion of the Control Authority. The Control Authority may select an independent contractor to conduct the sampling and/or analyses.

(d) Period of Surcharge

If analyses for BOD, TSS, or COD shows that a surcharge is applicable, the surcharge shall be retroactive for two (2) monthly billing periods and shall continue for four (4) monthly billing periods.

(e) Costs of Analyses

When analyses show that a surcharge shall be applied, a fee of $50 shall be added to a user's bill to cover the sampling, handling, and laboratory analyses. When analyses show that a surcharge shall not be applied, then this fee shall not be added to the user's bill.

(3) Fees Shall be Periodically Reviewed

In order to ensure an equitable cost recovery system, the Control Authority shall periodically review the fees and adjust them as appropriate.

10.413 CONFIDENTIALITY

Any information provided by a user that is claimed as confidential by the user shall be treated in accordance with the confidentiality requirements of the General Pretreatment Regulations. All other information which is submitted by the user to the City shall be available to the public at least to the extent provided by Title 40 Code of Federal Regulations, 403.14.

10.414 RIGHT OF REVISION

The City shall have the right to revise the Pretreatment Requirements to ensure compliance with federal, state, or local requirements.

10.415 PUBLIC PARTICIPATION

The City shall comply with the public participation requirements of Title 40 Code of Federal Regulations, 403.8(f)(2)(vii) in the enforcement of these Pretreatment Requirements.

SECTION 10.500 CREATION OF MUNICIPAL UTILITY DISTRICTS

Each request or petition to the city for its written consent for the creation of a municipal utility district shall be accompanied by a fee of five thousand dollars ($5,000.00) which shall be paid to the city to defray the expense of reviewing and responding to said request or petition.

SECTION 10.600 ENVIRONMENTAL SERVICES FEES

Fees established in this Section shall be periodically reviewed and adjusted to ensure an equitable cost recovery system.

601. This Section reserved for future use.

602. This Section reserved for future use.

603. **ANALYTICAL AND SAMPLING FEES**

1. Applicability

   The fees described herein do not apply to any sampling event or analytical work initiated by the City for the purposes of its own routine testing and monitoring.

2. Analytical Fees

   a. Analytical Fees for Wastewater

      Biochemical Oxygen Demand (BOD) $15.00per sample
      Total Suspended Solids (TSS) $15.00per sample
      Chemical Oxygen Demand (COD) $15.00per sample

   b. Water Bacteriological Fees

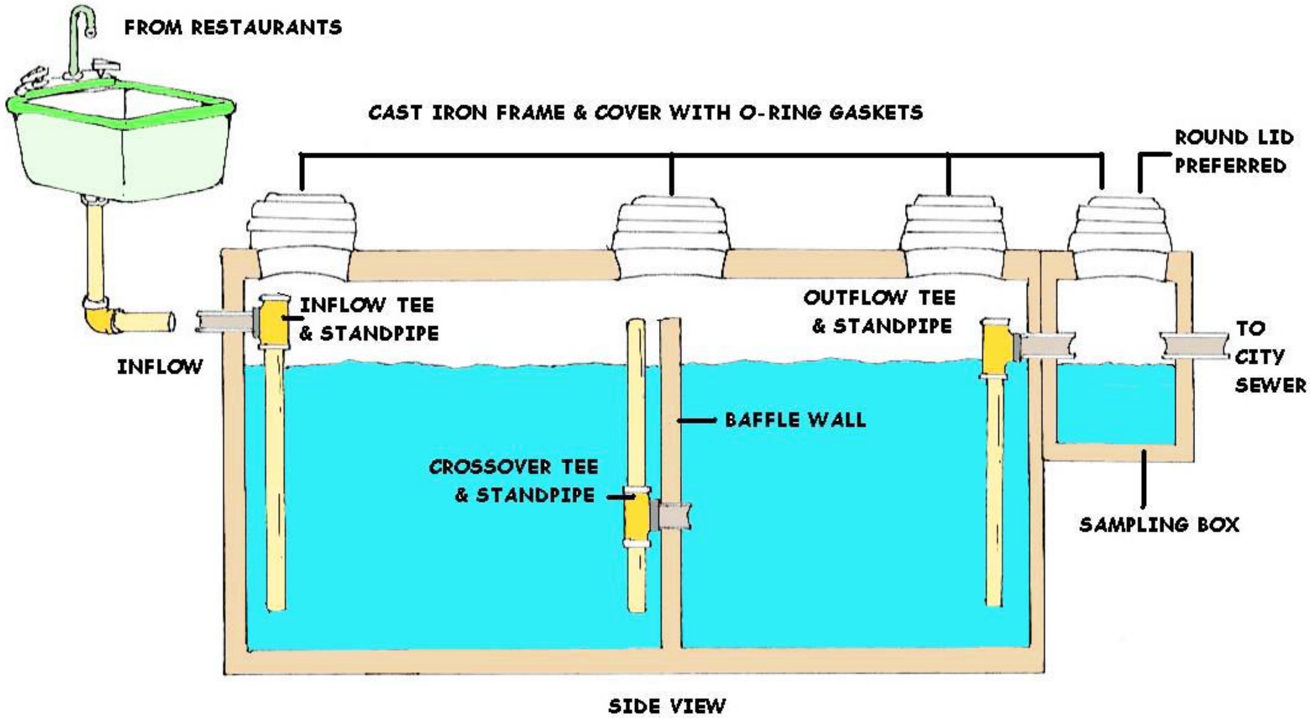
Fees for bacteriological analysis shall be $10.00 per water sample.

1. Sampling Fees
    a. The sampling fee for wastewater discharge is $75.00 per sampling event.
    b. The wastewater discharge sampling event consists of a twenty four hour composite sample taken by automatic sampler. The scheduling of this service is subject to approval and availability of the appropriate Public Works personnel.

1. Payment of Fees

Fees for analytical or sampling work requested by a water or wastewater customer of the City shall be billed to the customer on the monthly utility bill. Fees for analytical sampling work requested by persons or entities that are not water or wastewater customers of the City must be paid in advance at the Public Works office. Requests for analytical or sampling work must be accompanied by the appropriate paper work and evidence of payment, if applicable.

Grease Disposal Program



Did you know that cooking grease is one of the major causes of residential sewer main clogs resulting in sewer spills?

Cooking grease coats pipelines much like fatty foods clog human arteries. The grease clings to the insides of the pipe, eventually causing blockage and potential sewer spills. By following a few simple steps, you can help prevent costly sewer spills in the future.

* All cooking oil (this includes salad oil, frying oil and bacon fat) should be poured into an old milk carton, frozen juice container, or other non-recyclable package, and disposed of in the garbage.
* Dishes and pots that are coated with greasy leftovers, should be wiped clean with a disposable towel prior to washing or placing in the dishwasher.
* Instead of placing fat trimmings from meat down the garbage disposal, place them in a trash can.

Vactor

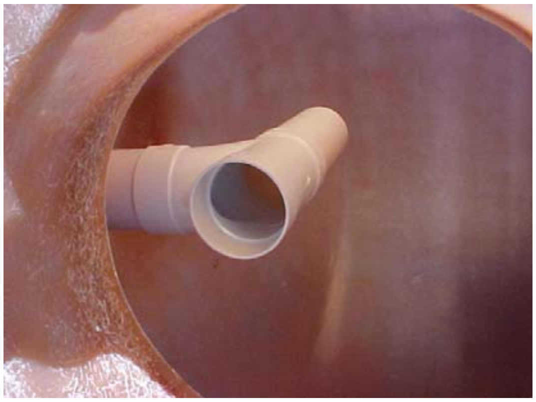
Grease Trap

The trap prevents excess grease from getting into the sewer system from existing plumbing lines within facilities. Traps are small and are usually installed inside a facility. Generally, they range in size from 20 gallons per minute (gpm) to 50 gpm.

Infloor Grease trap being removed and replaced with a grease interceptor

Grease Interceptors

High-volume or new establishments use grease interceptors which are larger than the traps and are installed underground, outside of a facility. Grease is actually *"intercepted"* in these concrete tanks before it reaches the City sewer main. Grease interceptors should be accessible by three manhole covers, and a sample box. Interceptors and traps cause the flow of water to slow down, allowing the grease to naturally float to the top of the tank for easy removal.



New Fiberglass three compartment grease interceptor. You will need to fill the interceptor with water before connecting it to the sewer main.

Plan Checks and Inspections

All plans for new commercial food establishments (including new construction remodels and retrofits) should receive a plan review from the POTW. This review assures that appropriate grease-removal equipment is installed during construction.

Grease Blockages

Shortly after sewer-spills caused by grease are reported, POTW inspectors investigate facilities within the immediate area. A determination is made as to which commercial facilities contributed to the blockage, and more in-depth inspections are conducted at those facilities. Where appropriate, additional requirements and/or procedures are put in place.

When requirements are made for additional grease-removal equipment, the facility is given a due date to comply. A Notice of Violation, with an administrative fee, is issued once a facility has passed its final due date. Administrative hearings, permit revocation, and ultimately, termination of sewer service may occur for those facilities that remain out of compliance.

Regular Grease Inspection

Regular inspection and maintenance is essential to the proper operation of a grease removal device. The local ordinance should require a minimum cleaning frequency of once every six months. However, that frequency will increase depending on the capacity of the device, the amount of grease in the wastewater, and the degree to which the facility has contributed to blockages in the past.

Regular cleaning at the appropriate interval is necessary to maintain the rated efficiency of the device. Equipment that is not regularly maintained puts the food service facility at risk of violating the sewer use ordinance, and this may not be known until an overflow and violation have occurred.

Most POTWs suggest businesses start with quarterly cleanings that should be done when 75 percent of the retention capacity of the unit is full of accumulated grease. A large measuring stick and/or a clear piece of conduit may be used to determine the depth of the grease accumulation.

You should contract with a licensed grease hauler to remove it from your premises for appropriate disposal.

Choosing a Grease Hauler

When selecting a grease hauler, be aware that services and prices can vary. Minimum services should include:

- Complete pumping and cleaning of the interceptor and sample box, rather than just skimming the grease layer.
- Deodorizing and thorough cleaning of affected areas, as necessary.
- Disposal/reclamation at an approved location.
- Notes concerning the condition of the interceptor.
- Complete pumping and cleaning record.

You and your hauler should agree on an adequate cleaning frequency to avoid blockage of the line.

Recyclable grease storage
Waste grease from a kitchen is recyclable for use in making soap, animal feed, etc. Grease from a grease trap or interceptor may not be reused in this way.

For recyclable grease, some POTWs recommend that all facilities have waste grease containers, with tight fitting lids, that are either secondarily contained or kept in a bermed area to protect floor drains and storm drain inlets from spills.

Keeping up-to-date records
Careful record keeping is one of the best ways to ensure that your grease removal device is being cleaned and maintained on a regular basis. City codes and ordnances require records be maintained for a minimum of three to five years.

Other types of devices
A grease trap may be approved in lieu of an interceptor for full service food service facilities only in very limited circumstances when space is not available.

Grease traps may also be approved by the Industrial Pretreatment Program for facilities such as delicatessens and small bakeries that produce small quantities of oil, grease, or fat . Refer to the International Plumbing Code for requirements related to grease traps such as installation of flow-control devices, flow rates, and other structural requirements.

Please Note: flow restrictors are required for grease traps because they increase retention time and efficiency. Automatic grease skimming devices collect small volumes of water and remove grease into a side container at preset times each day.

Usually, special approval from the Industrial Pretreatment Staff or the POTW is required to install one of these devices in lieu of a grease interceptor.

Magic Grease "Bugs" and Bacterial Additives
Manufacturers of bacterial additives claim that their products can remove grease and enhance the performance of grease traps and interceptors Such additives cannot be substituted for a grease removal device and regular inspection and maintenance. If you decide to use an additive, make sure the product you select is not an emulsifier, which simply keeps grease in suspension temporarily and allows it to flow to the sewer system.

Obtaining Necessary Permits
• Building departments prefer in-ground installations that drain by gravity to the sanitary sewer. Avoid pumps and other mechanical devices in your connection to the sewer if possible.
• Size your interceptor or grease trap in accordance with the International Plumbing Code, IAPMO or local ordnance.

Combined Sewer Overflows (CSOs)

Combined sewer systems are designed to collect both sanitary wastewater and storm water runoff. During dry weather, combined sewers carry sanitary waste to a POTW. During wet weather, the combined sanitary waste and storm water can overflow and discharge untreated wastewater directly to a surface water through a combined sewer overflow (**CSO**).

In 1994, the EPA published a CSO Control Policy (59 FR 18688). CSOs are regulated as point sources, and require NPDES permits.

The CSO Control Policy includes Nine Minimum Controls (**NMC**) for CSO management, which are requirements for any CSO NPDES Permit:

1. Proper operation and regular maintenance programs for the sewer system and the CSOs;
2. Maximum use of the collection system for storage;
3. Review and modification of pretreatment requirements to ensure that CSO impacts are minimized;
4. Maximization of flow to the POTW for treatment;
5. Prohibition of CSOs during dry weather;
6. Control of solid and floatable materials in CSOs;
7. Establishment of pollution prevention programs;
8. Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts;
9. Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

Development of a Long Term Control Plan **(LTCP)** is also required for management of CSOs. For more information, visit the EPA Wet Weather information page, which includes a graphic representation of Urban Wet Weather Flows.

A Vactor clearing a Manhole

Stormwater

Stormwater runoff is rainwater or melted snow that flows across the ground and eventually into lakes, streams, wetlands, underground water supplies, and the ocean.

The construction of pavement and buildings, and the clearing and flattening of fields increase the volume and speed of stormwater runoff. This contributes to flooding and damage to property and habitat (stormwater quantity impacts). It also contributes to lowering of water quality by increasing the flow of human pollutants such as oil, fertilizers and pesticides, and the flow of natural elements such as phosphorus, into the water (stormwater quality impacts).

Degradation of lakes, streams and wetlands has economic effects: it reduces property values, raises bills from public water utilities, raises local property tax rates, and reduces tourism and related business income.

The U.S. Environmental Protection Agency (**EPA**) estimates that 60% of the water quality problems in the nation are caused by nonpoint sources.

Stormwater runoff has quantity and quality impacts. When impervious or disturbed areas are created by construction activities and stormwater is not adequately managed, the environment may be adversely affected by: (1) changes in volume, timing, and location of the stormwater discharges, and (2) the movement of pollutants from the site to waterbodies. Stormwater runoff can cause flooding, undermine stream banks, and damage property and habitat, as well as carry contaminants that contribute to lower water quality.

Nonpoint source (**NPS**) pollution is water pollution that consists of contaminated runoff associated with agricultural, urban, and other sources. The term “**nonpoint source pollution**” was created under the federal Clean Water Act to distinguish it from “point source” discharges such as industrial wastewater from pipes.

Nonpoint sources include many varied small sources of pollutants from activities.

Every time it rains or the snow melts, pollutants such as dirt, nutrients, bacteria, oils and heavy metals are swept off from land surfaces and carried by runoff water into surface and groundwater.

When people speak about “**stormwater quality control**”, they are talking about reducing the pollutants from nonpoint sources that are carried by stormwater into our lakes, streams, groundwater, and coastal areas.

The Clean Water Act of 1972 (passed by the United States Congress and amended by the Water Quality Act of 1987) set in motion requirements and policy measures for the Environmental Protection Agency (EPA). The EPA therewith established regulatory components for Storm Water Discharges which were levied upon associated industries and municipalities with populations over 100,000.

The goal of NPDES, through permits and plans, is to reduce to the maximum extent practical, the amount of pollution discharges from the municipal storm drainage systems. These municipal permits have several components, one being management programs. A term frequently used in this subject matter is **- Best Management Practices** (**BMP**).

BMP's are schedules of activities, prohibition of practices, maintenance procedures, and other recommended management practices that may be employed for a particular purpose - Storm Water Pollution Prevention and Reduction.

Although the EPA / NPDES regulations seem complex, their goal is simple **- *"Improve water quality in waters of the United States".***

Evidence of illegal paint and chemical dumping.

What is Nonpoint Source Pollution?

Nonpoint source (**NPS**) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water.

These pollutants include:
- Excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, and toxic chemicals from urban runoff and energy production;
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks;
- Salt from irrigation practices and acid drainage from abandoned mines;
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems;

Atmospheric deposition and hydromodification are also sources of nonpoint source pollution.

What are the effects of these pollutants on our waters?
States report that nonpoint source pollution is the leading remaining cause of water quality problems. The effects of nonpoint source pollutants on specific waters vary and may not always be fully assessed. However, we know that these pollutants have harmful effects on drinking water supplies, recreation, fisheries, and wildlife.

What causes nonpoint source pollution?
Nonpoint source pollution results from a wide variety of human activities on the land. Each of us can contribute to the problem without even realizing it.

Leachate from a landfill, a strange green colored water.

Leachates
Leachates are liquids that have dripped through the landfill and carry dissolved substances from the waste materials, containing such substances as heavy metals and organic decomposition products; salt; bacteria; and viruses.

Stormwater Program Requirements

Regulation: 40 CFR 122.26

Applicability

The EPA's National Pollutant Discharge Elimination System (**NPDES**) stormwater discharge permit program was developed to regulate the runoff of stormwater from various types of facilities. Covered facilities are required to obtain NPDES permits, submit management plans to reduce runoff, and disconnect illegal connections to storm drains.

A permittee is required to develop a pollution prevention plan that details the best management practices the facility will use to ensure that the stormwater from its site does not impact surface waters.

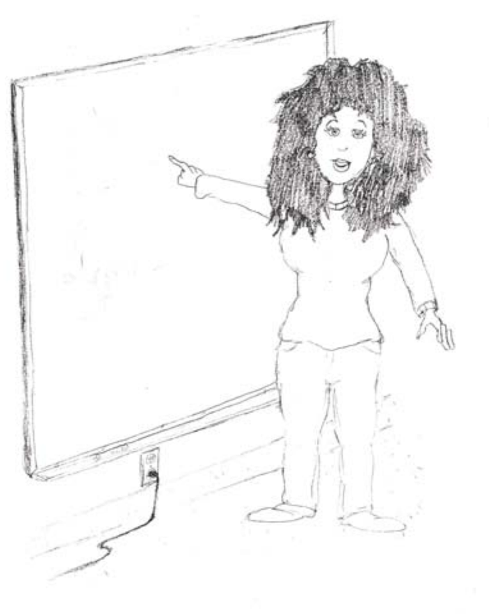
The permittee must also develop a training program that covers such topics as spill prevention and response, good housekeeping, and material management practices so that employees are aware of the goals of the stormwater pollution prevention plan (**SWPPP**) and have an overall understanding of its provisions.

Phase I of the NPDES stormwater discharge permit program regulates:

- Operators of medium and large municipal separate storm sewer systems that generally serve or are located in incorporated places and counties with populations of 100,000 or more.
- Operators of 11 categories of industrial activity—one of which is construction activity disturbing five or more acres of land—that discharge stormwater runoff to waters of the United States or into municipal separate storm sewer systems.

Phase II of the NPDES stormwater discharge permit program regulates two classes of stormwater dischargers on a nationwide basis:

- Operators of small municipal separate storm sewer systems located in urbanized areas.
- Operators of construction activities that disturb equal to or greater than one acre of land but less than five acres.



Training Requirements

An employee training program must inform personnel at all levels of the responsibility of the components and goals of the facility stormwater pollution prevention plan (**SWPPP**).

The training program should be an ongoing, yearly process. Facilities are required to specify a schedule for periodic training activities in the SWPPP.

Best Management Practices

Good Housekeeping

Good housekeeping practices are designed to maintain a clean and orderly work environment. Often, the most effective first step towards preventing pollution in stormwater from industrial sites simply involves using good common sense to improve the facility's basic housekeeping methods.

Poor housekeeping can result in more waste being generated than necessary and an increased potential for stormwater contamination. A clean and orderly work area reduces the possibility of accidental spills caused by mishandling of chemicals and equipment and should reduce safety hazards to plant personnel.

Well-maintained material and chemical storage will reduce the possibility of stormwater mixing with pollutants. Good housekeeping procedures may include:

- Improving operation and maintenance of machinery and processes.
- Implementing careful storage practices.
- Keeping an up-to-date inventory and labeling all containers.
- Scheduling routine cleanup operations.
- Training employees on good housekeeping techniques.

Preventive Maintenance

Preventive maintenance includes the regular inspection and testing of plant equipment and operational systems.

These inspections should uncover conditions, such as cracks or slow leaks, that could cause breakdowns or failures that result in discharges of chemicals to storm sewers and surface waters. The program should prevent breakdowns and failures through adjustment, repair, or replacement of equipment.

An effective preventive maintenance program should include:

- Identification of equipment, systems, and facility areas that should be inspected.
- Schedule for periodic inspections or tests of such equipment and systems.
- Appropriate and timely adjustment, repair, or replacement of equipment and systems.
- Maintenance of complete records on inspections, equipment, and systems.

Examples of equipment to be inspected at a facility can include:

- Pipes
- Pumps
- Storage tanks and bins
- Pressure vessels
- Pressure release valves
- Process and material handling equipment
- Stormwater management devices (oil/water separators, catch basins, or other structural or treatment BMPs)

Spill Prevention and Response

Spills and leaks together account for one of the largest industrial sources of stormwater pollutants and are avoidable in most cases. Establishing standard operating procedures, such as safety and spill prevention procedures, along with proper employee training can reduce these accidental releases.

The steps to take for spill prevention and response usually involve:

- Identify potential spill areas (such as loading and unloading areas, storage areas, process activities, dust or particulate generating processes, and waste disposal activities).
- Specify material handling procedures and storage requirements.
- Identify spill response procedures and equipment (such as spill response team; safety measures; notification of authorities; spill containment, diversion, isolation, and cleanup; and spill response equipment).

Visual Inspections

Regular visual inspections are the means to ensure that all of the elements of the SWPPP are in place and working properly. They are routine look-overs of the facility to identify conditions that may give rise to contamination of stormwater runoff with pollutants from the facility.

Areas to be inspected should include:

- Areas around all equipment listed in the preventive maintenance box
- Areas where spills and leaks have occurred in the past
- Material storage areas
- Outdoor material processing areas
- Material handling areas
- Waste generation, storage, treatment, and disposal areas

All inspections must be documented, and the records must be kept with the SWPPP.

Sediment and Erosion Control

There may be certain areas on your site that, due to construction activities, steep slopes, sandy soils, or other reasons, are prone to soil erosion. Construction activities typically remove grass and other protective ground covers, resulting in the exposure of underlying soil to wind and rain. Similarly, steep slopes or sandy soils may not be capable of supporting plant life, leaving soils exposed. Because the soil surface is unprotected, dirt and sand particles are easily picked up by wind and/or washed away by rain. This process is called erosion. Erosion can be controlled or prevented with the use of certain BMPs.

It is important to:

- Identify areas that, due to topography, activities, or other factors, have a high potential for significant soil erosion.
- Identify structural, vegetative, and/or stabilization measures to be used to limit erosion.

Management of Runoff

Traditional stormwater management practices can be used to direct stormwater away from areas of exposed materials or potential pollutants. These management practices can also be used to direct stormwater that contains pollutants to natural or other types of treatment locations.

The potential of various sources at the facility to contribute pollutants to stormwater discharges associated with industrial activity must be considered when determining reasonable and appropriate measures.

Appropriate measures include:

- **Vegetative swales and practices**
- **Reuse of collected stormwater**
- **Inlet controls (such as oil/water separators)**
- **Snow management activities**
- **Infiltration devices**
- **Wet detention/retention devices**

Monitoring and Sampling

In addition to instituting BMPs, facilities may be required to implement a program of sampling and monitoring of their stormwater discharges. The terms of the permit will indicate the levels of sampling and monitoring required at a facility.

Stormwater Management Practices

A watershed manager needs to make careful choices about what stormwater management practices should be installed in the subwatershed to compensate for the hydrological changes caused by new and existing development. Stormwater management practices are used to delay, capture, store, treat, or infiltrate stormwater runoff. A key choice is to determine the primary stormwater objectives for a subwatershed that will govern the selection, design, and location of stormwater management practices at individual sites. While specific design objectives for stormwater management practices are often unique to each subwatershed, the general goals for stormwater management practices are often the same, and include:

- **maintaining groundwater quality and recharge;**
- **reducing stormwater pollutant loads;**
- **protecting stream channels;**
- **preventing increased overbank flooding; and**
- **safely conveying extreme floods.**

There are numerous structural stormwater management techniques for controlling stormwater quantity and quality. These five practices can be categorized into five broad groups, including:

- **ponds**
- **wetlands**
- **infiltration**
- **filtering systems and**
- **grassed channels**

While many advances have been made recently in innovative stormwater management designs, their ability to maintain resource quality in the absence of other watershed protection tools is limited. In fact, stormwater management practices designed or located improperly can sometimes cause more severe secondary environmental impacts than if they were not installed at all.

Basic Program Requirements

Stormwater Monitoring Program:

Objective: To obtain a baseline measurement of current water quality, discover and eliminate illicit connections to the system and, the development of watershed drainage runoff data to assist in engineering studies for future developments.

Industrial Monitoring Program:

Objective: To evaluate industrial storm water runoff locations and to perform physical site inspections and develop future pollution prevention plans.

Illicit Connection Program:

Objective: To discover and eliminate illicit connections to the storm sewer system.

In-Stream Monitoring Program:

Objective: To improve data collection and interpretation. Analysis of the monitoring sites with a full scan of pollutants as required by the NPDES permit.

Household Hazardous Waste Program:

Objective: To eliminate household hazardous waste from contaminating the storm water.

Public Educational Program:

Objective: Create a public awareness of the pollutional risk of misusing and improper disposal of chemicals. Recycling techniques and water conservation are also parts of an overall program.

Recycling Program

Objective: To reduce the amount of household hazardous waste disposed of improperly as well as to recover recyclable materials from the waste stream thereby reducing the demand on the landfills and improving the environment.

Young and socially responsible. Recycle.

Spill Response Program:

Objective: To prevent pollutants from entering the Storm Drainage System.

Storm Sewer Maintenance:

Objective: To prevent failure of the Storm Drainage System by performing preventative maintenance and repairs in a timely, cost-effective manner.

Street Cleaning Program:

Objective: To remove debris that has collected on the streets before it can enter the drainage system and contaminate the Storm water.

Overflow Elimination Program

Objective: To reduce the amount of overflows to the storm drain system, and increase the efficiency of expenditures by planning and coordinating all infrastructure type projects.

Clearing and Grading Permit Administration:

Objective: To allow local inspectors from the City to review construction drawings and field check compliance with such.

New and Redevelopment Program:

Objective: To reduce the discharge of pollutants to the Municipal Separate Storm Sewer System; minimize potential short and long term water quality impacts; establish inspection and enforcement procedures and appropriate control measures; develop appropriate education and training measures; and notification process for applicants of their potential responsibilities under the NPDES permitting program.

Animal Feeding Operations (AFOs) and Concentrated Animal Feeding Operations (CAFOs)

Any facility which stables, confines, feeds, or maintains animals for at least 45 days in a 12 month period, and does not sustain crops or vegetation forage growth over any portion of the facility is an animal feeding operation (**AFO**). AFOs which meet certain size and location criteria are defined as concentrated animal feeding operations (**CAFOs**). By criteria listed at 40 CFR 122 Appendix B, a CAFO is a facility which has:

- more than 1,000 animal units;
- between 301 and 1,000 animal units and that may or does discharge pollutants into navigable waters through a manmade conveyance, or discharges pollutants directly into waters of the United States; or
- been designated a CAFO by the permitting authority on a case-by-case basis.

An animal unit (AU) is a unit of measure based on manure production of various types of livestock. One animal unit is equal to one slaughter cow, and numbers for other types of livestock are converted to AU using coefficients set forth at 40 CFR 122 Appendix B (e.g., 1 horse = 2.0 AU, 1 dairy cow = 1.4 AU, 1 swine = 0.4 AU, 1 sheep = 0.1 AU).

Facilities which are CAFOs are regulated under the point source program, and require NPDES permits. Effluent limitations guidelines for CAFOs are found at 40 CFR 412. For regulatory resources, visit the Library of EPA resources on CAFOs, which includes a downloadable *"Final Guidance on NPDES Regulations for Concentrated Animal Feeding Operations," December 1995.*

Livestock Area

The EPA and the United States Department of Agriculture have recently partnered to address water quality impacts from all animal feeding operations. On March 9, 1999 the EPA and the USDA issued the Draft Unified National Strategy for Animal Feeding Operations.

Wastewater Treatment Process

One of the most common forms of pollution control in the United States is *wastewater treatment.*

The country has a vast system of collection sewers, pumping stations, and treatment plants. Sewers collect the wastewater from homes, businesses, and many industries, and deliver it to plants for treatment. Most treatment plants were built to clean wastewater for discharge into streams or other receiving waters, or for reuse.

Years ago, when sewage was dumped into waterways, a natural process of purification began. First, the sheer volume of clean water in the stream diluted wastes. Bacteria and other small organisms in the water consumed the sewage and other organic matter, turning it into new bacterial cells, carbon dioxide and other products.

Today's higher populations and greater volume of domestic and industrial wastewater require that communities give nature a helping hand. The basic function of wastewater treatment is to speed up the natural processes by which water is purified. There are two basic stages in the treatment of wastes, *primary* and *secondary,* which are outlined here.

In the primary stage, solids are allowed to settle and removed from wastewater. The secondary stage uses biological processes to further purify wastewater. Sometimes, these stages are combined into one operation.

Primary Treatment
As sewage enters a plant for treatment, it flows through a *screen,* which removes large floating objects such as rags and sticks that might clog pipes or damage equipment. After sewage has been screened, it passes into a *grit chamber,* where cinders, sand, and small stones settle to the bottom.

A grit chamber is particularly important in communities with combined sewer systems where sand or gravel may wash into sewers along with stormwater. After screening is completed and grit has been removed, sewage still contains organic and inorganic matter along with other suspended solids.

These solids are minute particles that can be removed from sewage in a *sedimentation tank.* When the speed of the flow through one of these tanks is reduced, the suspended solids will gradually sink to the bottom, where they form a mass of solids called *raw primary biosolids formerly called sludge or raw primary sludge).*

Wastewater sludge combined with newspapers to make compost

Biosolids are usually removed from tanks by pumping, after which it may be further treated for use as a fertilizer, or disposed of in a landfill or incinerated. Over the years, primary treatment alone has been unable to meet many communities' demands for higher water quality. To meet them, cities and industries normally treat to a *secondary treatment level,* and in some cases, also use advanced treatment to remove nutrients and other contaminants.

Secondary Treatment

The *secondary stage* of treatment removes about 85 percent of the organic matter in sewage by making use of the bacteria in it. The principal secondary treatment techniques used are *the trickling filter* and the *activated sludge process.*

After effluent leaves the sedimentation tank in the primary stage it flows or is pumped to a facility using one or the other of these processes. A trickling filter is simply a bed of stones from three to six feet deep through which sewage passes. More recently, interlocking pieces of corrugated plastic or other synthetic media have also been used in trickling beds. Bacteria gather and multiply on these stones until they can consume most of the organic matter. The cleaner water trickles out through pipes for further treatment. From a trickling filter, the partially treated sewage flows to another sedimentation tank to remove excess bacteria.

The trend today is towards the use of the activated sludge process instead of trickling filters. The activated sludge process speeds up the work of the bacteria by bringing air and sludge heavily laden with bacteria into close contact with sewage.

After the sewage leaves the settling tank in the primary stage, it is pumped into an *aeration tank,* where it is mixed with air and sludge loaded with bacteria and allowed to remain for several hours. During this time, the bacteria break down the organic matter into harmless by-products. The sludge, now activated with additional billions of bacteria and other tiny organisms, can be used again by returning it to the aeration tank for mixing with air and new sewage. From the aeration tank, the partially treated sewage flows to another sedimentation tank for removal of excess bacteria.

To complete secondary treatment, effluent from the sedimentation tank is usually *disinfected* with chlorine before being discharged into receiving waters. Chlorine is fed into the water to kill pathogenic bacteria, and to reduce odor. Done properly, chlorination will kill more than 99 percent of the harmful bacteria in an effluent. Some municipalities now manufacture chlorine solution on site to avoid transporting and storing large amounts of chlorine, sometimes in a gaseous form.

Federal law now requires the removal of excess chlorine before discharge to surface waters by a process called dechlorination. Alternatives to chlorine disinfection, such as ultraviolet light or ozone, are also being used in situations where chlorine in treated sewage effluents may be harmful to fish and other aquatic life.

Other Treatment Options

New pollution problems have placed additional burdens on wastewater treatment systems. Today's pollutants, such as heavy metals, chemical compounds, and toxic substances, are more difficult to remove from water. Rising demands on the water supply only aggravates the problem. The increasing need to reuse water calls for better wastewater treatment. These challenges are being met through better methods of removing pollutants at treatment plants, or through prevention of pollution at the source.

Pretreatment of industrial waste, for example, removes many troublesome pollutants at the beginning, not the end, of the pipeline. To return more usable water to receiving lakes and streams, new methods for removing pollutants are being developed.

Advanced waste treatment techniques in use or under development range from biological treatment capable of removing nitrogen and phosphorus to physical-chemical separation techniques such as *filtration, carbon adsorption, distillation,* and *reverse osmosis.* These wastewater treatment processes, alone or in combination, can achieve almost any degree of pollution control desired, Waste effluents purified by such treatment can be used for industrial, agricultural, or recreational purposes, or even drinking water supplies.

Basic Wastewater Treatment Processes

1. Plant Influent: Waste enters the treatment facility through the municipal sewer system. Raw wastewater enters the treatment facility at the beginning of the treatment plant, referred to as the "***headworks***" of the plant. The wastewater is then pumped to the wastewater treatment facility using pumps.

Preliminary treatment removes large objects from the wastewater to help prevent clogging of pipes and damaging the treatment equipment. The debris that is removed during preliminary treatment is typically hauled to a landfill for disposal.

2. Coarse Bar Screen: Metal bars collect large debris such as rags, wood, plastics, etc.

3. Grit Removal: The wastewater flows through a channel, allowing dense, inorganic material to settle on the bottom. Scrapers, hoppers and clam buckets remove the collected grits.

4. Primary Settling: The wastewater flows into large settling tanks which allow suspended solids and organic material to sink to the bottom of these tanks. The raw sludge that settles to the bottom of these tanks is removed through hoppers and sent through the digestion process.

5. Partially treated wastewater is drawn from the top of the settling tanks and in some treatment facilities, chemicals are added to remove phosphorous.

6. Aeration Basins: Large aeration basins or tanks mix the partially treated wastewater with oxygen to support bacteria which devour organic waste. The bacteria levels are managed to provide the most efficient removal process.

Aeration Basins are used in a process referred to as activated sludge. Activated sludge is a biological process where oxygen is bubbled through the water, providing aeration. The microorganisms (or "**bugs**") are suspended in the wastewater by the aeration. The mixture is known as "**mixed liquor**." The bugs break down the wastes to carbon dioxide and water.

The mixed liquor is discharged to the final clarifiers to settle out the microorganisms which are then returned to the aeration basin. Excess biosolids, which have settled out, are sent to the solids handling processes.

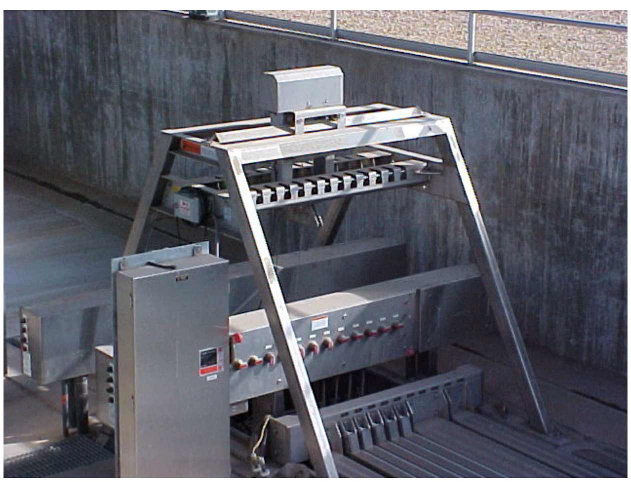
Similar to Primary Clarifiers are ***Secondary Clarifiers.*** These slow the speed of the wastewater to allow solids to settle out of the wastewater.

Clarifiers are used to settle out microorganisms from the activated sludge process.

Clarifiers typically have rotating arms which are used to remove scum from the surface of the water. Clarifiers are usually either round or rectangular in shape. The sludge or ***biosolids*** are collected at the bottom of the clarifier and sent to a digester for further treatment.

7. Final Settling: The cleanest wastewater is drawn from the top of the aeration tanks through spillways. By this point the water is already quite clear. Polymers may be added to concentrate any remaining material. Once again, suspended particles settle to the bottom and are removed by scrapers or hoppers.

8. Disinfection: The cleanest water is drawn from the surface and disinfected with chlorine, ozone or ultra-violet light to kill bacteria.



UV light generator and the actual UV light.

9. The treated water is de-chlorinated. The treated water is tested to ensure it meets the EPA standards and is returned to the original water source. Before the treated water is discharged to the receiving stream, samples are taken.

The samples are then analyzed in a laboratory. An automatic sampler will automatically take samples at designated times. The samples are then kept refrigerated in the sampler until the sample can be analyzed in the lab.

De-chlorination channel and automatic sampler.

10. Sludge from the final settling tanks is drawn from the bottom of the tanks and pumped to the primary settling tank. Not only does this sludge have a high water content, but it also contains oxygen and bacteria which improve the efficiency of the treatment process.

The gravity belt thickener is one way to reduce the amount of water in the biosolids before further treatment. The volume reduction is occurring from the loss of water. Thickening of the biosolids improves digester operation and reduces the cost of sludge digestion.

11. Primary Digest: Sludge removed throughout the process is pumped to digesters for processing. Anaerobic bacteria consume organic waste in the digesters. This process produces gases which can be used to fuel plant boilers and heat facilities.

Final Clarifiers are also used to settle out microorganisms (or "**bugs**") from the activated sludge process. Clarifiers are usually either round or rectangular in shape.

Once the wastewater leaves the final clarifier, it is typically disinfected to remove any bacteria. The solids are sent to a solids handling system, such as a solids thickener.

12. Dewatering Process: Vacuum filter or centrifuge systems remove water from the processed sludge to thicken it. The water removed in the process is pumped to the primary settling tank to reenter the treatment process.

13. Depending on **NPDES Permit**, the concentrated sludge, or bio-solid waste is taken away for incineration or conversion into fertilizer.

The end product of anaerobic digestion is a biologically stable substance that has nutrient and soil-enhancing properties, referred to as *Biosolids*. Biosolids are typically stored until the material can be land applied or disposed of in a landfill. Much of the biosolids produced are applied to farm land. Biosolids contain many of the same nutrients as commercial fertilizers, including valuable organic matter, nitrogen, phosphorus, calcium, magnesium, and micronutrients, such as zinc and iron.

While not a complete replacement for chemical fertilizers in terms of nutrient ratios, biosolids do some things that chemical fertilizers can't do. They are composed of organic matter that promotes necessary bacterial activity and improves the structure, texture, and water retention characteristics of the soil. These properties stimulate growth of vegetation, which helps reduce soil erosion and improve crop yields. Biosolids also provide trace metals and nutrients that commercial fertilizers do not have.

Trickling Filter
A trickling filter provides aerobic treatment of the wastewater. The wastewater is generally pumped from a compartment of the septic tank, dispersed over a media bed, and allowed to drain back into the tank. The wastewater is aerated as it flows over the media.

A Trickling Filter consists of a rotating arm that sprays wastewater over a filter medium. The filter medium can consist of rocks, plastic, or other material. The filter material is coarse, allowing air to flow through the media.

This process does not actually filter material out, however. Bacteria grow on the filter material. The bacteria then absorb and consume the waste as it trickles through the filter, improving the quality of the wastewater. The water is collected at the bottom of the filter for further treatment.

Aerobic Treatment Units
Aerobic treatment units use a biological process to transform dissolved and solid pollutants into gases, cell mass, and nongradable material (EPA Manual). The treatment process occurs in a mixed state with a variety of microorganisms living together that can decompose a broad range of materials. The organisms live in an aerobic environment where free oxygen is available for the organism respiration. It is important to maintain an active population of microbes to carry out the breakdown of the solids.

Anaerobic Digestion
Anaerobic digestion is the biological degradation of organic matter in an oxygen free atmosphere. Anaerobic digestion converts the biosolids into carbon dioxide, methane, hydrogen sulfide, other gases, and water. What is left behind is a biologically stable residue, referred to as *biosolids*.

Typically, the biosolids are reused as a soil amendment. The biosolids are rich in nutrients and provide a good alternative to fertilizer.

Sand Filters
Sand filters are a biological and physical wastewater treatment component consisting of an under drained bed of sand to which pre-treated effluent is periodically applied.

A sand filter purifies the water through three main mechanisms: filtration, chemical sorption, and assimilation.

Wetland Systems
Wetland systems are used to remove biological materials, suspended solids, nutrients, and pathogens from the wastewater.

The constructed wetland wastewater treatment system consists of three components: septic tank, constructed wetland, and land application system. The wetland needs to have a sufficient cross sectional area to accept the water flow entering the wetland.

Covered basin used for odor control

TITLE 40--PROTECTION OF ENVIRONMENT CHAPTER I--ENVIRONMENTAL PROTECTION AGENCY PART 403--GENERAL PRETREATMENT REGULATIONS FOR EXISTING AND NEW SOURCES OF POLLUTION

33 U.S.C. 1251 et seq.

§ 403.1 Purpose and applicability.

(a) This part implements sections 204(b)(1)(C), 208(b)(2) (C)(iii), 301(b)(1)(A)(ii), 301(b)(2)(A)(ii), 301(h)(5) and 301(i)(2), 304 (e) and (g), 307, 308, 309, 402(b), 405, and 501(a) of the Federal Water Pollution Control Act as amended by the Clean Water Act of 1977 (Pub. L. 95-217) or "The Act". It establishes responsibilities of Federal, State, and local government, industry and the public to implement National Pretreatment Standards to control pollutants which pass through or interfere with treatment processes in Publicly Owned Treatment Works (POTWs) or which may contaminate sewage sludge.

(b) This regulation applies:

(1) To pollutants from non-domestic sources covered by Pretreatment Standards which are indirectly discharged into or transported by truck or rail or otherwise introduced into POTWs as defined below in § 403.3;

(2) To POTWs which receive wastewater from sources subject to National Pretreatment Standards;

(3) To States which have or are applying for National Pollutant Discharge Elimination System (NPDES) programs approved in accordance with section 402 of the Act; and

(4) To any new or existing source subject to Pretreatment Standards. National Pretreatment Standards do not apply to sources which Discharge to a sewer which is not connected to a POTW Treatment Plant.

(c) [Removed. See 60 FR 33932, June 29, 1995.]

Source

[46 FR 9439, Jan. 28, 1981, as amended at 48 FR 2776, Jan. 21, 1983; 60 FR 33932, June 29, 1995]

§ 403.2 Objectives of general pretreatment regulations.

By establishing the responsibilities of government and industry to implement National Pretreatment Standards this regulation fulfills three objectives:

(a) To prevent the introduction of pollutants into POTWs which will interfere with the operation of a POTW, including interference with its use or disposal of municipal sludge;

(b) To prevent the introduction of pollutants into POTWs which will pass through the treatment works or otherwise be incompatible with such works; and

(c) To improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges.

Source

46 FR 9439, Jan. 28, 1981.

§ 403.3 Definitions.

For the purposes of this part:

(a) Except as discussed below, the general definitions, abbreviations, and methods of analysis set forth in 40 CFR part 401 shall apply to this regulation.

(b) The term Act means Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 U.S.C. 1251, et seq.

(c) The term Approval Authority means the Director in an NPDES State with an approved State pretreatment program and the appropriate Regional Administrator in a non-NPDES State or NPDES State without an approved State pretreatment program.

(d) The term Approved POTW Pretreatment Program or Program or POTW Pretreatment Program means a program administered by a POTW that meets the criteria established in this

regulation (§§ 403.8 and 403.9) and which has been approved by a Regional Administrator or State Director in accordance with § 403.11 of this regulation.
(e) The term Director means the chief administrative officer of a State or Interstate water pollution control agency with an NPDES permit program approved pursuant to section 402(b) of the Act and an approved State pretreatment program.
(f) The term Water Management Division Director means one of the Directors of the Water Management Divisions within the Regional offices of the Environmental Protection Agency or this person's delegated representative.
(g) The term Indirect Discharge or Discharge means the introduction of pollutants into a POTW from any non-domestic source regulated under section 307(b), (c) or (d) of the Act.
(h) The term Industrial User or User means a source of Indirect Discharge.
(i) The term Interference means a Discharge which, alone or in conjunction with a discharge or discharges from other sources, both:
(1) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
(2) Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued there under (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.
(j) The term National Pretreatment Standard, Pretreatment Standard, or Standard means any regulation containing pollutant discharge limits promulgated by the EPA in accordance with section 307 (b) and (c) of the Act, which applies to Industrial Users. This term includes prohibitive discharge limits established pursuant to § 403.5.
(k)(1) The term New Source means any building, structure, facility or installation from which there is or may be a Discharge of pollutants, the construction of which commenced after the publication of proposed Pretreatment Standards under section 307(c) of the Act which will be applicable to such source if such Standards are thereafter promulgated in accordance with that section, provided that:
(i) The building, structure, facility or installation is constructed at a site at which no other source is located; or
(ii) The building, structure, facility or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
(iii) The production or wastewater generating processes of the building, structure, facility or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant, and the extent to which the new facility is engaged in the same general type of activity as the existing source should be considered.
(2) Construction on a site at which an existing source is located results in a modification rather than a new source if the construction does not create a new building, structure, facility or installation meeting the criteria of paragraphs (k)(1)(ii), or (k)(1)(iii) of this section but otherwise alters, replaces, or adds to existing process or production equipment.
(3) Construction of a new source as defined under this paragraph has commenced if the owner or operator has:
(i) Begun, or caused to begin as part of a continuous onsite construction program:
(A) Any placement, assembly, or installation of facilities or equipment; or

(B) Significant site preparation work including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment; or

(ii) Entered into a binding contractual obligation for the purchase of facilities or equipment which are intended to be used in its operation within a reasonable time. Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation under this paragraph.

(l) The terms NPDES Permit or Permit means a permit issued to a POTW pursuant to section 402 of the Act.

(m) The term NPDES State means a State (as defined in 40 CFR 122.2) or Interstate water pollution control agency with an NPDES permit program approved pursuant to section 402(b) of the Act.

(n) The term Pass Through means a Discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

(o) The term Publicly Owned Treatment Works or POTW means a treatment works as defined by section 212 of the Act, which is owned by a State or municipality (as defined by section 502(4) of the Act). This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW Treatment Plant. The term also means the municipality as defined in section 502(4) of the Act, which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works.

(p) The term POTW Treatment Plant means that portion of the POTW which is designed to provide treatment (including recycling and reclamation) of municipal sewage and industrial waste.

(q) The term Pretreatment means the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. The reduction or alteration may be obtained by physical, chemical or biological processes, process changes or by other means, except as prohibited by § 403.6(d). Appropriate pretreatment technology includes control equipment, such as equalization tanks or facilities, for protection against surges or slug loadings that might interfere with or otherwise be incompatible with the POTW. However, where wastewater from a regulated process is mixed in an equalization facility with unregulated wastewater or with wastewater from another regulated process, the effluent from the equalization facility must meet an adjusted pretreatment limit calculated in accordance with § 403.6(e).

(r) The term Pretreatment requirements means any substantive or procedural requirement related to Pretreatment, other than a National Pretreatment Standard, imposed on an Industrial User.

(s) The term Regional Administrator means the appropriate EPA Regional Administrator.

(t) Significant Industrial User. (1) Except as provided in paragraph (t)(2) of this section, the term Significant Industrial User means:

(i) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR chapter I, subchapter N; and

(ii) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority as defined in 40 CFR 403.12(a) on the basis that

the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).
(2) Upon a finding that an industrial user meeting the criteria in paragraph (t)(1)(ii) of this section has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority (as defined in 40 CFR 403.12(a)) may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.
(u) The term Submission means:
(1) A request by a POTW for approval of a Pretreatment Program to the EPA or a Director;
(2) A request by a POTW to the EPA or a Director for authority to revise the discharge limits in categorical Pretreatment Standards to reflect POTW pollutant removals; or
(3) A request to the EPA by an NPDES State for approval of its State pretreatment program.
Source
[46 FR 9439, Jan. 28, 1981, as amended at 49 FR 5132, Feb. 10, 1984; 49 FR 28059, July 10, 1984; 51 FR 20430, June 4, 1986; 51 FR 23760, July 1, 1986; 52 FR 1600, Jan. 14, 1987; 53 FR 40610, Oct. 17, 1988; 55 FR 30129, July 24, 1990]

§ 403.4 State or local law.
Nothing in this regulation is intended to affect any Pretreatment Requirements, including any standards or prohibitions, established by State or local law as long as the State or local requirements are not less stringent than any set forth in National Pretreatment Standards, or any other requirements or prohibitions established under the Act or this regulation. States with an NPDES permit program approved in accordance with section 402 (b) and (c) of the Act, or States requesting NPDES programs, are responsible for developing a State pretreatment program in accordance with § 403.10 of this regulation.
Source
46 FR 9439, Jan. 28, 1981.

§ 403.5 National pretreatment standards: Prohibited discharges.
(a)(1) General prohibitions. A User may not introduce into a POTW any pollutant(s) which cause Pass Through or Interference. These general prohibitions and the specific prohibitions in paragraph (b) of this section apply to each User introducing pollutants into a POTW whether or not the User is subject to other National Pretreatment Standards or any national, State, or local Pretreatment Requirements.
(2) Affirmative Defenses. A User shall have an affirmative defense in any action brought against it alleging a violation of the general prohibitions established in paragraph (a)(1) of this section and the specific prohibitions in paragraphs (b)(3), (b)(4), (b)(5), (b)(6), and (b)(7) of this section where the User can demonstrate that:
(i) It did not know or have reason to know that its Discharge, alone or in conjunction with a discharge or discharges from other sources, would cause Pass Through or Interference; and
(ii)(A) A local limit designed to prevent Pass Through and/or Interference, as the case may be, was developed in accordance with paragraph (c) of this section for each pollutant in the User's Discharge that caused Pass Through or Interference, and the User was in compliance with each such local limit directly prior to and during the Pass Through or Interference; or
(B) If a local limit designed to prevent Pass Through and/or Interference, as the case may be, has not been developed in accordance with paragraph (c) of this section for the pollutant(s) that caused the Pass Through or Interference, the User's Discharge directly prior to and during the Pass Through or Interference did not change substantially in nature or constituents from the User's prior discharge activity when the POTW was regularly in compliance with the POTW's NPDES permit requirements and, in the case of Interference, applicable requirements for sewage sludge use or disposal.

(b) Specific prohibitions. In addition, the following pollutants shall not be introduced into a POTW:
(1) Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21.
(2) Pollutants which will cause corrosive structural damage to the POTW, but in no case Discharges with pH lower than 5.0, unless the works is specifically designed to accommodate such Discharges;
(3) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in Interference;
(4) Any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a Discharge at a flow rate and/or pollutant concentration which will cause Interference with the POTW.
(5) Heat in amounts which will inhibit biological activity in the POTW resulting in Interference, but in no case heat in such quantities that the temperature at the POTW Treatment Plant exceeds 40[degrees]C (104[degrees]F) unless the Approval Authority, upon request of the POTW, approves alternate temperature limits.
(6) Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
(7) Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;
(8) Any trucked or hauled pollutants, except at discharge points designated by the POTW.
(c) When specific limits must be developed by POTW. (1) Each POTW developing a POTW Pretreatment Program pursuant to § 403.8 shall develop and enforce specific limits to implement the prohibitions listed in paragraphs (a)(1) and (b) of this section. Each POTW with an approved pretreatment program shall continue to develop these limits as necessary and effectively enforce such limits.
(2) All other POTW's shall, in cases where pollutants contributed by User(s) result in Interference or Pass-Through, and such violation is likely to recur, develop and enforce specific effluent limits for Industrial User(s), and all other users, as appropriate, which, together with appropriate changes in the POTW Treatment Plant's facilities or operation, are necessary to ensure renewed and continued compliance with the POTW's NPDES permit or sludge use or disposal practices.
(3) Specific effluent limits shall not be developed and enforced without individual notice to persons or groups who have requested such notice and an opportunity to respond.
(d) Local limits. Where specific prohibitions or limits on pollutants or pollutant parameters are developed by a POTW in accordance with paragraph (c) above, such limits shall be deemed Pretreatment Standards for the purposes of section 307(d) of the Act.
(e) EPA enforcement actions under section 309(f) of the Clean Water Act.
If, within 30 days after notice of an Interference or Pass Through violation has been sent by EPA to the POTW, and to persons or groups who have requested such notice, the POTW fails to commence appropriate enforcement action to correct the violation, EPA may take appropriate enforcement action under the authority provided in section 309(f) of the Clean Water Act.
(f) [Removed. See 60 FR 33932, June 29, 1995.]
Source
[46 FR 9439, Jan. 28, 1981, as amended at 51 FR 20430, June 4, 1986; 52 FR 1600, Jan. 14, 1987; 55 FR 30129, July 24, 1990; 60 FR 33932, June 29, 1995]

§ 403.6 National pretreatment standards: Categorical standards.
National pretreatment standards specifying quantities or concentrations of pollutants or pollutant properties which may be discharged to a POTW by existing or new industrial users in specific industrial subcategories will be established as separate regulations under the appropriate subpart of 40 CFR chapter I, subchapter N. These standards, unless specifically noted

otherwise, shall be in addition to all applicable pretreatment standards and requirements set forth in this part.

(a) Category Determination Request--(1) Application Deadline. Within 60 days after the effective date of a Pretreatment Standard for a subcategory under which an Industrial User may be included, the Industrial User or POTW may request that the Water Management Division Director or Director, as appropriate, provide written certification on whether the Industrial User falls within that particular subcategory. If an existing Industrial User adds or changes a process or operation which may be included in a subcategory, the existing Industrial User must request this certification prior to commencing discharge from the added or changed processes or operation. A New Source must request this certification prior to commencing discharge. Where a request for certification is submitted by a POTW, the POTW shall notify any affected Industrial User of such submission. The Industrial User may provide written comments on the POTW submission to the Water Management Division Director or Director, as appropriate, within 30 days of notification.

(2) Contents of Application. Each request shall contain a statement:

(i) Describing which subcategories might be applicable; and

(ii) Citing evidence and reasons why a particular subcategory is applicable and why others are not applicable. Any person signing the application statement submitted pursuant to this section shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(3) Deficient requests. The Water Management Division Director or Director will only act on written requests for determinations that contain all of the information required. Persons who have made incomplete submissions will be notified by the Water Management Division Director or Director that their requests are deficient and, unless the time period is extended, will be given 30 days to correct the deficiency. If the deficiency is not corrected within 30 days or within an extended period allowed by the Water Management Division Director or the Director, the request for a determination shall be denied.

(4) Final decision. (i) When the Water Management Division Director or Director receives a submittal he or she will, after determining that it contains all of the information required by paragraph (2) of this section, consider the submission, any additional evidence that may have been requested, and any other available information relevant to the request. The Water Management Division Director or Director will then make a written determination of the applicable subcategory and state the reasons for the determination.

(ii) Where the request is submitted to the Director, the Director shall forward the determination described in this paragraph to the Water Management Division Director who may make a final determination. The Water Management Division Director may waive receipt of these determinations. If the Water Management Division Director does not modify the Director's decision within 60 days after receipt thereof, or if the Water Management Division Director waives receipt of the determination, the Director's decision is final.

(iii) Where the request is submitted by the Industrial User or POTW to the Water Management Division Director or where the Water Management Division Director elects to modify the Director's decision, the Water Management Division Director's decision will be final.

(iv) The Water Management Division Director or Director, as appropriate, shall send a copy of the determination to the affected Industrial User and the POTW. Where the final determination is made by the Water Management Division Director, he or she shall send a copy of the determination to the Director.

(5) Requests for hearing and/or legal decision. Within 30 days following the date of receipt of notice of the final determination as provided for by paragraph (a)(4)(iv) of this section, the Requester may submit a petition to reconsider or contest the decision to the Regional Administrator who shall act on such petition expeditiously and state the reasons for his or her determination in writing.

(b) Deadline for Compliance with Categorical Standards. Compliance by existing sources with categorical Pretreatment Standards shall be within 3 years of the date the Standard is effective unless a shorter compliance time is specified in the appropriate subpart of 40 CFR chapter I, subchapter N. Direct dischargers with NPDES permits modified or reissued to provide a variance pursuant to section 301(i)(2) of the Act shall be required to meet compliance dates set in any applicable categorical Pretreatment Standard. Existing sources which become Industrial Users subsequent to promulgation of an applicable categorical Pretreatment Standard shall be considered existing Industrial Users except where such sources meet the definition of a New Source as defined in § 403.3(k). New Sources shall install and have in operating condition, and shall "start-up" all pollution control equipment required to meet applicable Pretreatment Standards before beginning to Discharge. Within the shortest feasible time (not to exceed 90 days), New Sources must meet all applicable Pretreatment Standards.

(c)(1) Concentration and mass limits. Pollutant discharge limits in categorical Pretreatment Standards will be expressed either as concentration or mass limits. Wherever possible, where concentration limits are specified in standards, equivalent mass limits will be provided so that local, State or Federal authorities responsible for enforcement may use either concentration or mass limits. Limits in categorical Pretreatment Standards shall apply to the effluent of the process regulated by the Standard, or as otherwise specified by the standard.

(2) When the limits in a categorical Pretreatment Standard are expressed only in terms of mass of pollutant per unit of production, the Control Authority may convert the limits to equivalent limitations expressed either as mass of pollutant discharged per day of effluent concentration for purposes of calculating effluent limitations applicable to individual Industrial Users.

(3) A Control Authority calculating equivalent mass-per-day limitations under paragraph (c)(2) of this section shall calculate such limitations by multiplying the limits in the Standard by the Industrial User's average rate of production. This average rate of production shall be based not upon the designed production capacity but rather upon a reasonable measure of the Industrial User's actual long-term daily production, such as the average daily production during a representative year. For new sources, actual production shall be estimated using projected production.

(4) A Control Authority calculating equivalent concentration limitations under paragraph (c)(2) of this section shall calculate such limitations by dividing the mass limitations derived under paragraph (c)(3) of this section by the average daily flow rate of the Industrial User's regulated process wastewater. This average daily flow rate shall be based upon a reasonable measure of the Industrial User's actual long-term average flow rate, such as the average daily flow rate during the representative year.

(5) Equivalent limitations calculated in accordance with paragraphs (c)(3) and (c)(4) of this section shall be deemed Pretreatment Standards for the purposes of section 307(d) of the Act and this part. Industrial Users will be required to comply with the equivalent limitations in lieu of the promulgated categorical standards from which the equivalent limitations were derived.

(6) Many categorical pretreatment standards specify one limit for calculating maximum daily discharge limitations and a second limit for calculating maximum monthly average, or 4-day average, limitations. Where such Standards are being applied, the same production of flow figure shall be used in calculating both types of equivalent limitations.

(7) Any Industrial User operating under a control mechanism incorporating equivalent mass or concentration limits calculated from a production based standard shall notify the Control Authority within two (2) business days after the User has a reasonable basis to know that the production level will significantly change within the next calendar month. Any User not notifying

the Control Authority of such anticipated change will be required to meet the mass or concentration limits in its control mechanism that were based on the original estimate of the long term average production rate.
(d) Dilution Prohibited as Substitute for Treatment. Except where expressly authorized to do so by an applicable Pretreatment Standard or Requirement, no Industrial User shall ever increase the use of process water, or in any other way attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with a Pretreatment Standard or Requirement. The Control Authority (as defined in § 403.12(a)) may impose mass limitations on Industrial Users which are using dilution to meet applicable Pretreatment Standards or Requirements, or in other cases where the imposition of mass limitations is appropriate.
(e) Combined wastestream formula. Where process effluent is mixed prior to treatment with wastewaters other than those generated by the regulated process, fixed alternative discharge limits may be derived by the Control Authority, as defined in § 403.12(a), or by the Industrial User with the written concurrence of the Control Authority. These alternative limits shall be applied to the mixed effluent. When deriving alternative categorical limits, the Control Authority or Industrial User shall calculate both an alternative daily maximum value using the daily maximum value(s) specified in the appropriate categorical Pretreatment Standard(s) and an alternative consecutive sampling day average value using the monthly average value(s) specified in the appropriate categorical Pretreatment Standard(s). The Industrial User shall comply with the alternative daily maximum and monthly average limits fixed by the Control Authority until the Control Authority modifies the limits or approves an Industrial User modification request. Modification is authorized whenever there is a material or significant change in the values used in the calculation to fix alternative limits for the regulated pollutant. An Industrial User must immediately report any such material or significant change to the Control Authority. Where appropriate new alternative categorical limits shall be calculated within 30 days.
(1) Alternative limit calculation. For purposes of these formulas, the "average daily flow" means a reasonable measure of the average daily flow for a 30-day period. For new sources, flows shall be estimated using projected values. The alternative limit for a specified pollutant will be derived by the use of either of the following formulas:
(i) Alternative concentration limit.

(1) The pollutants of concern are not detectable in the effluent from the Industrial User (paragraph (8)(a)(iii));
(2) The pollutants of concern are present only in trace amounts and are neither causing nor likely to cause toxic effects (paragraph (8)(a)(iii));
(3) The pollutants of concern are present in amounts too small to be effectively reduced by technologies known to the Administrator (paragraph (8)(a)(iii)); or
(4) The wastestream contains only pollutants which are compatible with the POTW (paragraph (8)(b)(i)).
F[T]] The average daily flow (at least a 30-day average) through the combined treatment facility (includes F[i], F[D] and unregulated streams).
N = The total number of regulated streams.
(ii) Alternative mass limit.

(1) The pollutants of concern are not detectable in the effluent from the Industrial User (paragraph (8)(a)(iii));
(2) The pollutants of concern are present only in trace amounts and are neither causing nor likely to cause toxic effects (paragraph (8)(a)(iii));
(3) The pollutants of concern are present in amounts too small to be effectively reduced by technologies known to the Administrator (paragraph (8)(a)(iii)); or

(4) The wastestream contains only pollutants which are compatible with the POTW (paragraph (8)(b)(i)).
F[T] = The average flow (at least a 30-day average) through the combined treatment facility (includes F[i], F[D] and unregulated streams).
N = The total number of regulated streams.
(1) The pollutants of concern are not detectable in the effluent from the Industrial User (paragraph (8)(a)(iii));
(2) The pollutants of concern are present only in trace amounts and are neither causing nor likely to cause toxic effects (paragraph (8)(a)(iii));
(3) The pollutants of concern are present in amounts too small to be effectively reduced by technologies known to the Administrator (paragraph (8)(a)(iii)); or
(4) The wastestream contains only pollutants which are compatible with the POTW (paragraph (8)(b)(i)).
F[T] = The average flow (at least a 30-day average) through the combined treatment facility (includes F[i,] F[D] and unregulated streams).
N = The total number of regulated streams.
(2) Alternate limits below detection limit. An alternative pretreatment limit may not be used if the alternative limit is below the analytical detection limit for any of the regulated pollutants.
(3) Self-monitoring. Self-monitoring required to insure compliance with the alternative categorical limit shall be conducted in accordance with the requirements of § 403.12(g).
(4) Choice of monitoring location. Where a treated regulated process wastestream is combined prior to treatment with wastewaters other than those generated by the regulated process, the Industrial User may monitor either the segregated process wastestream or the combined wastestream for the purpose of determining compliance with applicable Pretreatment Standards. If the Industrial User chooses to monitor the segregated process wastestream, it shall apply the applicable categorical Pretreatment Standard. If the User chooses to monitor the combined wastestream, it shall apply an alternative discharge limit calculated using the combined wastestream formula as provided in this section. The Industrial User may change monitoring points only after receiving approval from the Control Authority. The Control Authority shall ensure that any change in an Industrial User's monitoring point(s) will not allow the User to substitute dilution for adequate treatment to achieve compliance with applicable Standards.
(Information collection requirements are approved by the Office of Management and Budget under control number 2040-0009)
Source
[46 FR 9439, Jan. 28, 1981, as amended at 49 FR 21037, May 17, 1984; 49 FR 31224, Aug. 3, 1984; 51 FR 20430, June 4, 1986; 51 FR 23760, July 1, 1986; 53 FR 40610, Oct. 17, 1988; 55 FR 30129, July 24, 1990]

§ 403.7 Removal credits. (a) Introduction--(1) Definitions. For the purpose of this section:
(i) Removal means a reduction in the amount of a pollutant in the POTW's effluent or alteration of the nature of a pollutant during treatment at the POTW. The reduction or alteration can be obtained by physical, chemical or biological means and may be the result of specifically designed POTW capabilities or may be incidental to the operation of the treatment system. Removal as used in this subpart shall not mean dilution of a pollutant in the POTW.
(ii) Sludge Requirements shall mean the following statutory provisions and regulations or permits issued there under (or more stringent State or local regulations): Section 405 of the Clean Water Act; the Solid Waste Disposal Act (SWDA) (including title II more commonly referred to as the Resource Conservation Recovery Act (RCRA) and State regulations contained in any State sludge management plan prepared pursuant to subtitle D of SWDA); the Clean Air Act; the Toxic Substances Control Act; and the Marine Protection, Research and Sanctuaries Act.

(2) General. Any POTW receiving wastes from an Industrial User to which a categorical Pretreatment Standard(s) applies may, at its discretion and subject to the conditions of this section, grant removal credits to reflect removal by the POTW of pollutants specified in the categorical Pretreatment Standard(s). The POTW may grant a removal credit equal to or, at its discretion, less than its consistent removal rate. Upon being granted a removal credit, each affected Industrial User shall calculate its revised discharge limits in accordance with paragraph (a)(4) of this section. Removal credits may only be given for indicator or surrogate pollutants regulated in a categorical Pretreatment Standard if the categorical Pretreatment Standard so specifies.

(3) Conditions for authorization to give removal credits. A POTW is authorized to give removal credits only if the following conditions are met:

(i) Application. The POTW applies for, and receives, authorization from the Approval Authority to give a removal credit in accordance with the requirements and procedures specified in paragraph (e) of this section.

(ii) Consistent removal determination. The POTW demonstrates and continues to achieve consistent removal of the pollutant in accordance with paragraph (b) of this section.

(iii) POTW local pretreatment program. The POTW has an approved pretreatment program in accordance with and to the extent required by part 403; provided, however, a POTW which does not have an approved pretreatment program may, pending approval of such a program, conditionally give credits as provided in paragraph (d) of this section.

(iv) Sludge requirements. The granting of removal credits will not cause the POTW to violate the local, State and Federal Sludge Requirements which apply to the sludge management method chosen by the POTW. Alternatively, the POTW can demonstrate to the Approval Authority that even though it is not presently in compliance with applicable Sludge Requirements, it will be in compliance when the Industrial User(s) to whom the removal credit would apply is required to meet its categorical Pretreatment Standard(s) as modified by the removal credit. If granting removal credits forces a POTW to incur greater sludge management costs than would be incurred in the absence of granting removal credits, the additional sludge management costs will not be eligible for EPA grant assistance. Removal credits may be made available for the following pollutants.

(A) For any pollutant listed in appendix G section I of this part for the use or disposal practice employed by the POTW, when the requirements in 40 CFR part 503 for that practice are met.

(B) For any pollutant listed in appendix G section II of this part for the use or disposal practice employed by the POTW when the concentration for a pollutant listed in appendix G section II of this part in the sewage sludge that is used or disposed does not exceed the concentration for the pollutant in appendix G section II of this part.

(C) For any pollutant in sewage sludge when the POTW disposes all of its sewage sludge in a municipal solid waste landfill unit that meets the criteria in 40 CFR part 258.

(v) NPDES permit limitations. The granting of removal credits will not cause a violation of the POTW's permit limitations or conditions. Alternatively, the POTW can demonstrate to the Approval Authority that even though it is not presently in compliance with applicable limitations and conditions in its NPDES permit, it will be in compliance when the Industrial User(s) to whom the removal credit would apply is required to meet its categorical Pretreatment Standard(s), as modified by the removal credit provision.

(4) Calculation of revised discharge limits. Revised discharge limits for a specific pollutant shall be derived by use of the following formula:

$$y = \frac{x}{l - r}$$

where: discharge limit specified in the applicable categorical Pretreatment Standard
r=removal credit for that pollutant as established under paragraph (b) of this section (percentage removal expressed as a proportion, i.e., a number between 0 and 1)
y=revised discharge limit for the specified pollutant (expressed in same units as x)
(b) Establishment of Removal Credits; Demonstration of Consistent Removal--(1) Definition of Consistent Removal. "Consistent Removal" shall mean the average of the lowest 50 percent of the removal measured according to paragraph (b)(2) of this section. All sample data obtained for the measured pollutant during the time period prescribed in paragraph (b)(2) of this section must be reported and used in computing Consistent Removal. If a substance is measurable in the influent but not in the effluent, the effluent level may be assumed to be the limit of measurement, and those data may be used by the POTW at its discretion and subject to approval by the Approval Authority. If the substance is not measurable in the influent, the date may not be used. Where the number of samples with concentrations equal to or above the limit of measurement is between 8 and 12, the average of the lowest 6 removals shall be used. If there are less than 8 samples with concentrations equal to or above the limit of measurement, the Approval Authority may approve alternate means for demonstrating Consistent Removal. The term "measurement" refers to the ability of the analytical method or protocol to quantify as well as identify the presence of the substance in question.
(2) Consistent Removal Data. Influent and effluent operational data demonstrating Consistent Removal or other information, as provided for in paragraph (b)(1) of this section, which demonstrates Consistent Removal of the pollutants for which discharge limit revisions are proposed. This data shall meet the following requirements:
(i) Representative Data; Seasonal. The data shall be representative of yearly and seasonal conditions to which the POTW is subjected for each pollutant for which a discharge limit revision is proposed.
(ii) Representative Data; Quality and Quantity. The data shall be representative of the quality and quantity of normal effluent and influent flow if such data can be obtained. If such data are unobtainable, alternate data or information may be presented for approval to demonstrate Consistent Removal as provided for in paragraph (b)(1) of this section.
(iii) Sampling Procedures: Composite. (A) The influent and effluent operational data shall be obtained through 24-hour flow-proportional composite samples. Sampling may be done manually or automatically, and discretely or continuously. For discrete sampling, at least 12 aliquots shall be composited. Discrete sampling may be flow-proportioned either by varying the time interval between each aliquot or the volume of each aliquot. All composites must be flow-proportional to each stream flow at time of collection of influent aliquot or to the total influent flow since the previous influent aliquot. Volatile pollutant aliquots must be combined in the laboratory immediately before analysis.
(B)(1) Twelve samples shall be taken at approximately equal intervals throughout one full year. Sampling must be evenly distributed over the days of the week so as to include no-workdays as well as workdays. If the Approval Authority determines that this schedule will not be most representative of the actual operation of the POTW Treatment Plant, an alternative sampling schedule will be approved.
(2) In addition, upon the Approval Authority's concurrence, a POTW may utilize an historical data base amassed prior to the effective data of this section provide that such data otherwise meet the requirements of this paragraph. In order for the historical data base to be approved it must present a statistically valid description of daily, weekly and seasonal sewage treatment plant loadings and performance for at least one year.
(C) Effluent sample collection need not be delayed to compensate for hydraulic detention unless the POTW elects to include detention time compensation or unless the Approval Authority requires detention time compensation. The Approval Authority may require that each effluent sample be taken approximately one detention time later than the corresponding influent sample when failure to do so would result in an unrepresentative portrayal of actual POTW operation.

The detention period is to be based on a 24-hour average daily flow value. The average daily flow used will be based upon the average of the daily flows during the same month of the previous year.
(iv) Sampling Procedures: Grab. Where composite sampling is not an appropriate sampling technique, a grab sample(s) shall be taken to obtain influent and effluent operational data. Collection of influent grab samples should precede collection of effluent samples by approximately one detention period. The detention period is to be based on a 24-hour average daily flow value. The average daily flow used will be based upon the average of the daily flows during the same month of the previous year. Grab samples will be required, for example, where the parameters being evaluated are those, such as cyanide and phenol, which may not be held for any extended period because of biological, chemical or physical interactions which take place after sample collection and affect the results. A grab sample is an individual sample collected over a period of time not exceeding 15 minutes.
(v) Analytical methods. The sampling referred to in paragraphs (b)(2) (i) through (iv) of this section and an analysis of these samples shall be performed in accordance with the techniques prescribed in 40 CFR part 136 and amendments thereto. Where 40 CFR part 136 does not contain sampling or analytical techniques for the pollutant in question, or where the Administrator determines that the part 136 sampling and analytical techniques are inappropriate for the pollutant in question, sampling and analysis shall be performed using validated analytical methods or any other applicable sampling and analytical procedures, including procedures suggested by the POTW or other parties, approved by the Administrator.
(vi) Calculation of removal. All data acquired under the provisions of this section must be submitted to the Approval Authority. Removal for a specific pollutant shall be determined either, for each sample, by measuring the difference between the concentrations of the pollutant in the influent and effluent of the POTW and expressing the difference as a percent of the influent concentration, or, where such data cannot be obtained, Removal may be demonstrated using other data or procedures subject to concurrence by the Approval Authority as provided for in paragraph (b)(1) of this section.
(c) Provisional credits. For pollutants which are not being discharged currently (i.e., new or modified facilities, or production changes) the POTW may apply for authorization to give removal credits prior to the initial discharge of the pollutant. Consistent removal shall be based provisionally on data from treatability studies or demonstrated removal at other treatment facilities where the quality and quantity of influent are similar. Within 18 months after the commencement of discharge of pollutants in question, consistent removal must be demonstrated pursuant to the requirements of paragraph (b) of this section. If, within 18 months after the commencement of the discharge of the pollutant in question, the POTW cannot demonstrate consistent removal pursuant to the requirements of paragraph (b) of this section, the authority to grant provisional removal credits shall be terminated by the Approval Authority and all Industrial Users to whom the revised discharge limits had been applied shall achieve compliance with the applicable categorical Pretreatment Standard(s) within a reasonable time, not to exceed the period of time prescribed in the applicable categorical Pretreatment Standard(s), as may be specified by the Approval Authority.
(d) Exception to POTW Pretreatment Program Requirement. A POTW required to develop a local pretreatment program by § 403.8 may conditionally give removal credits pending approval of such a program in accordance with the following terms and conditions:
(1) All Industrial Users who are currently subject to a categorical Pretreatment Standard and who wish conditionally to receive a removal credit must submit to the POTW the information required in § 403.12(b)(1) through (7) (except new or modified industrial users must only submit the information required by § 403.12(b)(1) through (6)), pertaining to the categorical Pretreatment Standard as modified by the removal credit. The Industrial Users shall indicate what additional technology, if any, will be needed to comply with the categorical Pretreatment Standard(s) as modified by the removal credit;

(2) The POTW must have submitted to the Approval Authority an application for pretreatment program approval meeting the requirements of §§ 403.8 and 403.9 in a timely manner, not to exceed the time limitation set forth in a compliance schedule for development of a pretreatment program included in the POTW's NPDES permit, but in no case later than July 1, 1983, where no permit deadline exists;

(3) The POTW must:

(i) Compile and submit data demonstrating its consistent removal in accordance with paragraph (b) of this section;

(ii) Comply with the conditions specified in paragraph (a)(3) of this section; and

(iii) Submit a complete application for removal credit authority in accordance with paragraph (e) of this section;

(4) If a POTW receives authority to grant conditional removal credits and the Approval Authority subsequently makes a final determination, after appropriate notice, that the POTW failed to comply with the conditions in paragraphs (d)(2) and (3) of this section, the authority to grant conditional removal credits shall be terminated by the Approval Authority and all industrial Users to whom the revised discharge limits had been applied shall achieve compliance with the applicable categorical Pretreatment Standard(s) within a reasonable time, not to exceed the period of time prescribed in the applicable categorical Pretreatment Standard(s), as may be specified by the Approval Authority.

(5) If a POTW grants conditional removal credits and the POTW or the Approval Authority subsequently makes a final determination, after appropriate notice, that the Industrial User(s) failed to comply with the conditions in paragraph (d)(1) of this section, the conditional credit shall be terminated by the POTW or the Approval Authority for the non-complying Industrial User(s) and the Industrial User(s) to whom the revised discharge limits had been applied shall achieve compliance with the applicable categorical Pretreatment Standard(s) within a reasonable time, not to exceed the period of time prescribed in the applicable categorical Pretreatment Standard(s), as may be specified by the Approval Authority. The conditional credit shall not be terminated where a violation of the provisions of this paragraph results from causes entirely outside of the control of the Industrial User(s) or the Industrial User(s) had demonstrated substantial compliance.

(6) The Approval Authority may elect not to review an application for conditional removal credit authority upon receipt of such application, in which case the conditionally revised discharge limits will remain in effect until reviewed by the Approval Authority. This review may occur at any time in accordance with the procedures of § 403.11, but in no event later than the time of any pretreatment program approval or any NPDES permit re-issuance there under.

(e) POTW application for authorization to give removal credits and Approval Authority review--

(1) Who must apply. Any POTW that wants to give a removal credit must apply for authorization from the Approval Authority.

(2) To whom application is made. An application for authorization to give removal credits (or modify existing ones) shall be submitted by the POTW to the Approval Authority.

(3) When to apply. A POTW may apply for authorization to give or modify removal credits at any time.

(4) Contents of the Application. An application for authorization to give removal credits must be supported by the following information:

(i) List of pollutants. A list of pollutants for which removal credits are proposed.

(ii) Consistent Removal Data. The data required pursuant to paragraph (b) of this section.

(iii) Calculation of revised discharge limits. Proposed revised discharge limits for each affected subcategory of Industrial Users calculated in accordance with paragraph (a)(4) of this section.

(iv) Local Pretreatment Program Certification. A certification that the POTW has an approved local pretreatment program or qualifies for the exception to this requirement found at paragraph (d) of this section.

(v) Sludge Management Certification. A specific description of the POTW's current methods of using or disposing of its sludge and a certification that the granting of removal credits will not cause a violation of the sludge requirements identified in paragraph (a)(3)(iv) of this section.
(vi) NPDES Permit Limit Certification. A certification that the granting of removal credits will not cause a violation of the POTW's NPDES permit limits and conditions as required in paragraph (a)(3)(v) of this section.
(5) Approval Authority Review. The Approval Authority shall review the POTW's application for authorization to give or modify removal credits in accordance with the procedures of § 403.11 and shall, in no event, have more that 180 days from public notice of an application to complete review.
(6) EPA review of State removal credit approvals. Where the NPDES State has an approved pretreatment program, the Regional Administrator may agree in the Memorandum of Agreement under 40 CFR 123.24(d) to waive the right to review and object to submissions for authority to grant removal credits. Such an agreement shall not restrict the Regional Administrator's right to comment upon or object to permits issued to POTW's except to the extent 40 CFR 123.24(d) allows such restriction.
(7) Nothing in these regulations precludes an Industrial User or other interested party from assisting the POTW in preparing and presenting the information necessary to apply for authorization.
(f) Continuation and withdrawal of authorization--(1) Effect of authorization. (i) Once a POTW has received authorization to grant removal credits for a particular pollutant regulated in a categorical Pretreatment Standard it may automatically extend that removal credit to the same pollutant when it is regulated in other categorical standards, unless granting the removal credit will cause the POTW to violate the sludge requirements identified in paragraph (a)(3)(iv) of this section or its NPDES permit limits and conditions as required by paragraph (a)(3)(v) of this section. If a POTW elects at a later time to extend removal credits to a certain categorical Pretreatment Standard, industrial subcategory or one or more Industrial Users that initially were not granted removal credits, it must notify the Approval Authority.
(2) Inclusion in POTW permit. Once authority is granted, the removal credits shall be included in the POTW's NPDES Permit as soon as possible and shall become an enforceable requirement of the POTW's NPDES permit. The removal credits will remain in effect for the term of the POTW's NPDES permit, provided the POTW maintains compliance with the conditions specified in paragraph (f)(4) of this section.
(3) Compliance monitoring. Following authorization to give removal credits, a POTW shall continue to monitor and report on (at such intervals as may be specified by the Approval Authority, but in no case less than once per year) the POTW's removal capabilities. A minimum of one representative sample per month during the reporting period is required, and all sampling data must be included in the POTW's compliance report.
(4) Modification or withdrawal of removal credits--(i) Notice of POTW. The Approval Authority shall notify the POTW if, on the basis of pollutant removal capability reports received pursuant to paragraph (f)(3) of this section or other relevant information available to it, the Approval Authority determines:
(A) That one or more of the discharge limit revisions made by the POTW, of the POTW itself, no longer meets the requirements of this section, or
(B) That such discharge limit revisions are causing a violation of any conditions or limits contained in the POTW's NPDES Permit.
(ii) Corrective action. If appropriate corrective action is not taken within a reasonable time, not to exceed 60 days unless the POTW or the affected Industrial Users demonstrate that a longer time period is reasonably necessary to undertake the appropriate corrective action, the Approval Authority shall either withdraw such discharge limits or require modifications in the revised discharge limits.

(iii) Public notice of withdrawal or modification. The Approval Authority shall not withdraw or modify revised discharge limits unless it shall first have notified the POTW and all Industrial Users to whom revised discharge limits have been applied, and made public, in writing, the reasons for such withdrawal or modification, and an opportunity is provided for a hearing. Following such notice and withdrawal or modification, all Industrial Users to whom revised discharge limits had been applied, shall be subject to the modified discharge limits or the discharge limits prescribed in the applicable categorical Pretreatment Standards, as appropriate, and shall achieve compliance with such limits within a reasonable time (not to exceed the period of time prescribed in the applicable categorical Pretreatment Standard(s) as may be specified by the Approval Authority.

(g) Removal credits in State-run pretreatment programs under § 403.10(e). Where an NPDES State with an approved pretreatment program elects to implement a local pretreatment program in lieu or requiring the POTW to develop such a program (as provided in § 403.10(e)), the POTW will not be required to develop a pretreatment program as a precondition to obtaining authorization to give removal credits. The POTW will, however, be required to comply with the other conditions of paragraph (a)(3) of this section.

(h) Compensation for overflow. "Overflow" means the intentional or unintentional diversion of flow from the POTW before the POTW Treatment Plant. POTWs which at least once annually Overflow untreated wastewater to receiving waters may claims Consistent Removal of a pollutant only by complying with either paragraph (h)(1) of (h)(2) or this section. However, this subsection shall not apply where Industrial User(s) can demonstrate that Overflow does not occur between the Industrial User(s) and the POTW Treatment Plant;

(1) The Industrial User provides containment or otherwise ceases or reduces Discharges from the regulated processes which contain the pollutant for which an allowance is requested during all circumstances in which an Overflow event can reasonably be expected to occur at the POTW or at a sewer to which the Industrial User is connected. Discharges must cease or be reduced, or pretreatment must be increased, to the extent necessary to compensate for the removal not being provided by the POTW. Allowances under this provision will only be granted where the POTW submits to the Approval Authority evidence that:

(i) All Industrial Users to which the POTW proposes to apply this provision have demonstrated the ability to contain or otherwise cease or reduce, during circumstances in which an Overflow event can reasonably be expected to occur, Discharges from the regulated processes which contain pollutants for which an allowance is requested;

(ii) The POTW has identified circumstances in which an Overflow event can reasonably be expected to occur, and has a notification or other viable plan to insure that Industrial Users will learn of an impending Overflow in sufficient time to contain, cease or reduce Discharging to prevent untreated Overflows from occurring. The POTW must also demonstrate that it will monitor and verify the data required in paragraph (h)(1)(iii) of this section, to insure that Industrial Users are containing, ceasing or reducing operations during POTW System Overflow; and

(iii) All Industrial Users to which the POTW proposes to apply this provision have demonstrated the ability and commitment to collect and make available, upon request by the POTW, State Director or EPA Regional Administrator, daily flow reports or other data sufficient to demonstrate that all Discharges from regulated processes containing the pollutant for which the allowance is requested were contained, reduced or otherwise ceased, as appropriate, during all circumstances in which an Overflow event was reasonably expected to occur; or

(2)(i) The Consistent Removal claimed is reduced pursuant to the following equation:

$$rc = r\,m\,\frac{8760-Z}{8760}$$

Where:
rm = POTW's Consistent Removal rate for that pollutant as established under paragraphs (a)(1) and (b)(2) of this section
rc = removal corrected by the Overflow factor
Z = hours per year that Overflow occurred between the Industrial User(s) and the POTW Treatment Plant, the hours either to be shown in the POTW's current NPDES permit application or the hours, as demonstrated by verifiable techniques, that a particular Industrial User's Discharge Overflows between the Industrial User and the POTW Treatment Plant; and
(ii) After July 1, 1983, Consistent Removal may be claimed only where efforts to correct the conditions resulting in untreated Discharges by the POTW are underway in accordance with the policy and procedures set forth in "PRM 75-34" or "Program Guidance Memorandum-61" (same document) published on December 16, 1975, by EPA Office of Water Program Operations (WH-546). (See appendix A.) Revisions to discharge limits in categorical Pretreatment Standards may not be made where efforts have not been committed to by the POTW to minimize pollution from Overflows. At minimum, by July 1, 1983, the POTW must have completed the analysis required by PRM 75-34 and be making an effort to implement the plan.
(iii) If, by July 1, 1983, a POTW has begun the PRM 75-34 analysis but due to circumstances beyond its control has not completed it, Consistent Removal, subject to the approval of the Approval Authority, may continue to be claimed according to the formula in paragraph (h)(2)(i) of this section as long as the POTW acts in a timely fashion to complete the analysis and makes an effort to implement the non-structural cost-effective measures identified by the analysis; and so long as the POTW has expressed its willingness to apply, after completing the analysis, for a construction grant necessary to implement any other cost-effective Overflow controls identified in the analysis should Federal funds become available, so applies for such funds, and proceeds with the required construction in an expeditious manner. In addition, Consistent Removal may, subject to the approval of the Approval Authority, continue to be claimed according to the formula in paragraph (h)(2)(i) of this section where the POTW has completed and the Approval Authority has accepted the analysis required by PRM 75-34 and the POTW has requested inclusion in its NPDES permit of an acceptable compliance schedule providing for timely implementation of cost-effective measures identified in the analysis. (In considering what is timely implementation, the Approval Authority shall consider the availability of funds, cost of control measures, and seriousness of the water quality problem.)
(Information collection requirements are approved by the Office of Management and Budget under control number 2040-0009)
Source
[49 FR 31221, Aug. 3, 1984, as amended at 51 FR 20430, June 4, 1986; 53 FR 42435, Nov. 5, 1987; 58 FR 9386, Feb. 19, 1993; 58 FR 18017, Apr. 7, 1993]

§ 403.8 Pretreatment Program Requirements: Development and Implementation by POTW.

(a) POTWs required to develop a pretreatment program. Any POTW (or combination of POTWs operated by the same authority) with a total design flow greater than 5 million gallons per day (mgd) and receiving from Industrial Users pollutants which Pass Through or Interfere with the operation of the POTW or are otherwise subject to Pretreatment Standards will be required to establish a POTW Pretreatment Program unless the NPDES State exercises its option to assume local responsibilities as provided for in § 403.10(e). The Regional Administrator or Director may require that a POTW with a design flow of 5 mgd or less develop a POTW Pretreatment Program if he or she finds that the nature or volume of the industrial influent, treatment process upsets, violations of POTW effluent limitations, contamination of municipal sludge, or other circumstances warrant in order to prevent Interference with the POTW or Pass Through.

(b) Deadline for Program Approval. A POTW which meets the criteria of paragraph (a) of this section must receive approval of a POTW Pretreatment Program no later than 3 years after the re-issuance or modification of its existing NPDES permit but in no case later than July 1, 1983. POTWs whose NPDES permits are modified under section 301(h) of the Act shall have a Pretreatment Program within three (3) years as provided for in 40 CFR part 125, subpart G. POTWs identified after July 1, 1983 as being required to develop a POTW Pretreatment Program under paragraph (a) of this section shall develop and submit such a program for approval as soon as possible, but in no case later than one year after written notification from the Approval Authority of such identification. The POTW Pretreatment Program shall meet the criteria set forth in paragraph (f) of this section and shall be administered by the POTW to ensure compliance by Industrial Users with applicable Pretreatment Standards and Requirements.
(c) Incorporation of approved programs in permits. A POTW may develop an appropriate POTW Pretreatment Program any time before the time limit set forth in paragraph (b) of this section. The POTW's NPDES Permit will be reissued or modified by the NPDES State or EPA to incorporate the approved Program as enforceable conditions of the Permit. The modification of a POTW's NPDES Permit for the purposes of incorporating a POTW Pretreatment Program approved in accordance with the procedure in § 403.11 shall be deemed a minor Permit modification subject to the procedures in 40 CFR 122.63.
(d) Incorporation of compliance schedules in permits. [Reserved]
(e) Cause for re-issuance or modification of Permits. Under the authority of section 402(b)(1)(C) of the Act, the Approval Authority may modify, or alternatively, revoke and reissue a POTW's Permit in order to:
(1) Put the POTW on a compliance schedule for the development of a POTW Pretreatment Program where the addition of pollutants into a POTW by an Industrial User or combination of Industrial Users presents a substantial hazard to the functioning of the treatment works, quality of the receiving waters, human health, or the environment;
(2) Coordinate the issuance of a section 201 construction grant with the incorporation into a permit of a compliance schedule for POTW Pretreatment Program;
(3) Incorporate a modification of the permit approved under section 301(h) or 301(i) of the Act;
(4) Incorporate an approved POTW Pretreatment Program in the POTW permit; or
(5) Incorporate a compliance schedule for the development of a POTW pretreatment program in the POTW permit.
(6) Incorporate the removal credits (established under § 403.7) in the POTW permit.
(f) POTW pretreatment requirements. A POTW pretreatment program must be based on the following legal authority and include the following procedures. These authorities and procedures shall at all times be fully and effectively exercised and implemented.
(1) Legal authority. The POTW shall operate pursuant to legal authority enforceable in Federal, State or local courts, which authorizes or enables the POTW to apply and to enforce the requirements of sections 307 (b) and (c), and 402(b)(8) of the Act and any regulations implementing those sections. Such authority may be contained in a statute, ordinance, or series of contracts or joint powers agreements which the POTW is authorized to enact, enter into or implement, and which are authorized by State law. At a minimum, this legal authority shall enable the POTW to:
(i) Deny or condition new or increased contributions of pollutants, or changes in the nature of pollutants, to the POTW by Industrial Users where such contributions do not meet applicable Pretreatment Standards and Requirements or where such contributions would cause the POTW to violate its NPDES permit;
(ii) Require compliance with applicable Pretreatment Standards and Requirements by Industrial Users;
(iii) Control through permit, order, or similar means, the contribution to the POTW by each Industrial User to ensure compliance with applicable Pretreatment Standards and

Requirements. In the case of Industrial Users identified as significant under 40 CFR 403.3(t), this control shall be achieved through permits or equivalent individual control mechanisms issued to each such user. Such control mechanisms must be enforceable and contain, at a minimum, the following conditions:

(A) Statement of duration (in no case more than five years);

(B) Statement of non-transferability without, at a minimum, prior notification to the POTW and provision of a copy of the existing control mechanism to the new owner or operator;

(C) Effluent limits based on applicable general pretreatment standards in part 403 of this chapter, categorical pretreatment standards, local limits, and State and local law;

(D) Self-monitoring, sampling, reporting, notification and recordkeeping requirements, including an identification of the pollutants to be monitored, sampling location, sampling frequency, and sample type, based on the applicable general pretreatment standards in part 403 of this chapter, categorical pretreatment standards, local limits, and State and local law;

(E) Statement of applicable civil and criminal penalties for violation of pretreatment standards and requirements, and any applicable compliance schedule. Such schedules may not extend the compliance date beyond applicable federal deadlines.

(iv) Require (A) the development of a compliance schedule by each Industrial User for the installation of technology required to meet applicable Pretreatment Standards and Requirements and (B) the submission of all notices and self-monitoring reports from Industrial Users as are necessary to assess and assure compliance by Industrial Users with Pretreatment Standards and Requirements, including but not limited to the reports required in § 403.12.

(v) Carry out all inspection, surveillance and monitoring procedures necessary to determine, independent of information supplied by Industrial Users, compliance or noncompliance with applicable Pretreatment Standards and Requirements by Industrial Users. Representatives of the POTW shall be authorized to enter any premises of any Industrial User in which a Discharge source or treatment system is located or in which records are required to be kept under § 403.12(m) to assure compliance with Pretreatment Standards. Such authority shall be at least as extensive as the authority provided under section 308 of the Act;

(vi)(A) Obtain remedies for noncompliance by any Industrial User with any Pretreatment Standard and Requirement. All POTW's shall be able to seek injunctive relief for noncompliance by Industrial Users with Pretreatment Standards and Requirements. All POTWs shall also have authority to seek or assess civil or criminal penalties in at least the amount of $ 1,000 a day for each violation by Industrial Users of Pretreatment Standards and Requirements.

(B) Pretreatment requirements which will be enforced through the remedies set forth in paragraph (f)(1)(vi)(A) of this section, will include but not be limited to, the duty to allow or carry out inspections, entry, or monitoring activities; any rules, regulations, or orders issued by the POTW; any requirements set forth in individual control mechanisms issued by the POTW; or any reporting requirements imposed by the POTW or these regulations. The POTW shall have authority and procedures (after informal notice to the discharger) immediately and effectively to halt or prevent any discharge of pollutants to the POTW which reasonably appears to present an imminent endangerment to the health or welfare of persons. The POTW shall also have authority and procedures (which shall include notice to the affected industrial users and an opportunity to respond) to halt or prevent any discharge to the POTW which presents or may present an endangerment to the environment or which threatens to interfere with the operation of the POTW. The Approval Authority shall have authority to seek judicial relief and may also use administrative penalty authority when the POTW has sought a monetary penalty which the Approval Authority believes to be insufficient.

(vii) Comply with the confidentiality requirements set forth in § 403.14.

(2) Procedures. The POTW shall develop and implement procedures to ensure compliance with the requirements of a Pretreatment Program. At a minimum, these procedures shall enable the POTW to:

(i) Identify and locate all possible Industrial Users which might be subject to the POTW Pretreatment Program. Any compilation, index or inventory of Industrial Users made under this paragraph shall be made available to the Regional Administrator or Director upon request;
(ii) Identify the character and volume of pollutants contributed to the POTW by the Industrial Users identified under paragraph (f)(2)(i) of this section. This information shall be made available to the Regional Administrator or Director upon request;
(iii) Notify Industrial Users identified under paragraph (f)(2)(i) of this section, of applicable Pretreatment Standards and any applicable requirements under sections 204(b) and 405 of the Act and subtitles C and D of the Resource Conservation and Recovery Act. Within 30 days of approval pursuant to 40 CFR 403.8(f)(6), of a list of significant industrial users, notify each significant industrial user of its status as such and of all requirements applicable to it as a result of such status.
(iv) Receive and analyze self-monitoring reports and other notices submitted by Industrial Users in accordance with the self-monitoring requirements in § 403.12;
(v) Randomly sample and analyze the effluent from industrial users and conduct surveillance activities in order to identify, independent of information supplied by industrial users, occasional and continuing noncompliance with pretreatment standards. Inspect and sample the effluent from each Significant Industrial User at least once a year. Evaluate, at least once every two years, whether each such Significant Industrial User needs a plan to control slug discharges. For purposes of this subsection, a slug discharge is any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge. The results of such activities shall be available to the Approval Authority upon request. If the POTW decides that a slug control plan is needed, the plan shall contain, at a minimum, the following elements:
(A) Description of discharge practices, including non-routine batch discharges;
(B) Description of stored chemicals;
(C) Procedures for immediately notifying the POTW of slug discharges, including any discharge that would violate a prohibition under 40 CFR 403.5(b), with procedures for follow-up written notification within five days;
(D) If necessary, procedures to prevent adverse impact from accidental spills, including inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site run-off, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents), and/or measures and equipment for emergency response;
(vi) Investigate instances of noncompliance with Pretreatment Standards and Requirements, as indicated in the reports and notices required under § 403.12, or indicated by analysis, inspection, and surveillance activities described in paragraph (f)(2)(v) of this section. Sample taking and analysis and the collection of other information shall be performed with sufficient care to produce evidence admissible in enforcement proceedings or in judicial actions; and
(vii) Comply with the public participation requirements of 40 CFR part 25 in the enforcement of national pretreatment standards. These procedures shall include provision for at least annual public notification, in the largest daily newspaper published in the municipality in which the POTW is located, of industrial users which, at any time during the previous twelve months, were in significant noncompliance with applicable pretreatment requirements. For the purposes of this provision, an industrial user is in significant noncompliance if its violation meets one or more of the following criteria:
(A) Chronic violations of wastewater discharge limits, defined here as those in which sixty-six percent or more of all of the measurements taken during a six-month period exceed (by any magnitude) the daily maximum limit or the average limit for the same pollutant parameter;
(B) Technical Review Criteria (TRC) violations, defined here as those in which thirty-three percent or more of all of the measurements for each pollutant parameter taken during a six-month period equal or exceed the product of the daily maximum limit or the average limit

multiplied by the applicable TRC (TRC=1.4 for BOD, TSS, fats, oil, and grease, and 1.2 for all other pollutants except pH.
(C) Any other violation of a pretreatment effluent limit (daily maximum or longer-term average) that the Control Authority determines has caused, alone or in combination with other discharges, interference or pass through (including endangering the health of POTW personnel or the general public);
(D) Any discharge of a pollutant that has caused imminent endangerment to human health, welfare or to the environment or has resulted in the POTW's exercise of its emergency authority under paragraph (f)(1)(vi)(B) of this section to halt or prevent such a discharge;
(E) Failure to meet, within 90 days after the schedule date, a compliance schedule milestone contained in a local control mechanism or enforcement order for starting construction, completing construction, or attaining final compliance;
(F) Failure to provide, within 30 days after the due date, required reports such as baseline monitoring reports, 90-day compliance reports, periodic self-monitoring reports, and reports on compliance with compliance schedules;
(G) Failure to accurately report noncompliance;
(H) Any other violation or group of violations which the Control Authority determines will adversely affect the operation or implementation of the local pretreatment program.
(3) Funding. The POTW shall have sufficient resources and qualified personnel to carry out the authorities and procedures described in paragraphs (f) (1) and (2) of this section. In some limited circumstances, funding and personnel may be delayed where (i) the POTW has adequate legal authority and procedures to carry out the Pretreatment Program requirements described in this section, and (ii) a limited aspect of the Program does not need to be implemented immediately (see § 403.9(b)).
(4) Local limits. The POTW shall develop local limits as required in § 403.5(c)(1), or demonstrate that they are not necessary.
(5) The POTW shall develop and implement an enforcement response plan. This plan shall contain detailed procedures indicating how a POTW will investigate and respond to instances of industrial user noncompliance. The plan shall, at a minimum:
(i) Describe how the POTW will investigate instances of noncompliance;
(ii) Describe the types of escalating enforcement responses the POTW will take in response to all anticipated types of industrial user violations and the time periods within which responses will take place;
(iii) Identify (by title) the official(s) responsible for each type of response;
(iv) Adequately reflect the POTW's primary responsibility to enforce all applicable pretreatment requirements and standards, as detailed in 40 CFR 403.8 (f)(1) and (f)(2).
(6) The POTW shall prepare and maintain a list of its industrial users meeting the criteria in § 403.3(u)(1). The list shall identify the criteria in § 403.3(u)(1) applicable to each industrial user and, for industrial users meeting the criteria in § 403.3(u)(ii), shall also indicate whether the POTW has made a determination pursuant to § 403.3(u)(2) that such industrial user should not be considered a significant industrial user. The initial list shall be submitted to the Approval Authority pursuant to § 403.9 as a non-substantial modification pursuant to § 403.18(d). Modifications to the list shall be submitted to the Approval Authority pursuant to § 403.12(i)(1).
Source
[46 FR 9439, Jan. 28, 1981, as amended at 49 FR 31224, Aug. 3, 1984; 51 FR 20429, 20430, June 4, 1986; 51 FR 23759, July 1, 1986; 53 FR 40612, Oct. 17, 1988; 55 FR 30129, July 24, 1990; 58 FR 18017, Apr. 7, 1993; 60 FR 33932, June 29, 1995; 62 FR 38406, 38414, July 17, 1997]

Notes
[EFFECTIVE DATE NOTE: 62 FR 38406, 38414, July 17, 1997, revised paragraphs (c) and (f)(6), effective Aug. 18, 1997.]

§ 403.9 POTW pretreatment programs and/r authorization to revise pretreatment standards: Submission for approval.

(a) Who approves Program. A POTW requesting approval of a POTW Pretreatment Program shall develop a program description which includes the information set forth in paragraphs (b)(1) through (4) of this section. This description shall be submitted to the Approval Authority which will make a determination on the request for program approval in accordance with the procedures described in § 403.11.
(b) Contents of POTW program submission. The program description must contain the following information:
(1) A statement from the City Solicitor or a city official acting in a comparable capacity (or the attorney for those POTWs which have independent legal counsel) that the POTW has authority adequate to carry out the programs described in § 403.8. This statement shall:
(i) Identify the provision of the legal authority under § 403.8(f)(1) which provides the basis for each procedure under § 403.8(f)(2);
(ii) Identify the manner in which the POTW will implement the program requirements set forth in § 403.8, including the means by which Pretreatment Standards will be applied to individual Industrial Users (e.g., by order, permit, ordinance, etc.); and,
(iii) Identify how the POTW intends to ensure compliance with Pretreatment Standards and Requirements, and to enforce them in the event of noncompliance by Industrial Users;
(2) A copy of any statutes, ordinances, regulations, agreements, or other authorities relied upon by the POTW for its administration of the Program. This Submission shall include a statement reflecting the endorsement or approval of the local boards or bodies responsible for supervising and/or funding the POTW Pretreatment Program if approved;
(3) A brief description (including organization charts) of the POTW organization which will administer the Pretreatment Program. If more than one agency is responsible for administration of the Program the responsible agencies should be identified, their respective responsibilities delineated, and their procedures for coordination set forth; and
(4) A description of the funding levels and full- and part-time manpower available to implement the Program;
(c) Conditional POTW program approval. The POTW may request conditional approval of the Pretreatment Program pending the acquisition of funding and personnel for certain elements of the Program. The request for conditional approval must meet the requirements set forth in paragraph (b) of this section except that the requirements of paragraph (b) of this section, may be relaxed if the Submission demonstrates that:
(1) A limited aspect of the Program does not need to be implemented immediately;
(2) The POTW had adequate legal authority and procedures to carry out those aspects of the Program which will not be implemented immediately; and
(3) Funding and personnel for the Program aspects to be implemented at a later date will be available when needed. The POTW will describe in the Submission the mechanism by which this funding will be acquired. Upon receipt of a request for conditional approval, the Approval Authority will establish a fixed date for the acquisition of the needed funding and personnel. If funding is not acquired by this date, the conditional approval of the POTW Pretreatment Program and any removal allowances granted to the POTW, may be modified or withdrawn.
(d) Content of removal allowance submission. The request for authority to revise categorical Pretreatment Standards must contain the information required in § 403.7(d).
(e) Approval authority action. Any POTW requesting POTW Pretreatment Program approval shall submit to the Approval Authority three copies of the Submission described in paragraph (b), and if appropriate, (d) of this section. Within 60 days after receiving the Submission, the Approval Authority shall make a preliminary determination of whether the Submission meets the requirements of paragraph (b) and, if appropriate, (d) of this section. If the Approval Authority

makes the preliminary determination that the Submission meets these requirements, the Approval Authority shall:
(1) Notify the POTW that the Submission has been received and is under review; and
(2) Commence the public notice and evaluation activities set forth in § 403.11.
(f) Notification where submission is defective. If, after review of the Submission as provided for in paragraph (e) of this section, the Approval Authority determines that the Submission does not comply with the requirements of paragraph (b) or (c) of this section, and, if appropriate, paragraph (d), of this section, the Approval Authority shall provide notice in writing to the applying POTW and each person who has requested individual notice. This notification shall identify any defects in the Submission and advise the POTW and each person who has requested individual notice of the means by which the POTW can comply with the applicable requirements of paragraphs (b), (c) of this section, and, if appropriate, paragraph (d) of this section.
(g) Consistency with water quality management plans. (1) In order to be approved the POTW Pretreatment Program shall be consistent with any approved water quality management plan developed in accordance with 40 CFR parts 130, 131, as revised, where such 208 plan includes Management Agency designations and addresses pretreatment in a manner consistent with 40 CFR part 403. In order to assure such consistency the Approval Authority shall solicit the review and comment of the appropriate 208 Planning Agency during the public comment period provided for in § 403.11(b)(1)(ii) prior to approval or disapproval of the Program.
(2) Where no 208 plan has been approved or where a plan has been approved but lacks Management Agency designations and/or does not address pretreatment in a manner consistent with this regulation, the Approval Authority shall nevertheless solicit the review and comment of the appropriate 208 planning agency.
(Information collection requirements are approved by the Office of Management and Budget under control number 2040-0009)
Source
[53 FR 9439, Jan. 28, 1981, as amended at 53 FR 40612, Oct. 17, 1988; Apr. 7, 1993]

§ 403.10 Development and submission of NPDES State pretreatment programs.

(a) Approval of State Programs. No State NPDES program shall be approved under section 402 of the Act after the effective date of these regulations unless it is determined to meet the requirements of paragraph (f) of this section. Notwithstanding any other provision of this regulation, a State will be required to act upon those authorities which it currently possesses before the approval of a State Pretreatment Program.
(b) [Removed and reserved. See 60 FR 33932, June 29, 1995.]
(c) Failure to request approval. Failure of an NPDES State with a permit program approved under section 402 of the Act prior to December 27, 1977, to seek approval of a State Pretreatment Program and failure of an approved State to administer its State Pretreatment Program in accordance with the requirements of this section constitutes grounds for withdrawal of NPDES program approval under section 402(c)(3) of the Act.
(d) [Removed and reserved. See 60 FR 33932, June 29, 1995.]
This permit shall be modified, or alternatively, revoked and reissued, by September 27, 1979 (or September 27, 1980, as appropriate) to incorporate an approved POTW Pretreatment Program or a compliance schedule for the development of a POTW Pretreatment Program as required under section 402(b)(8) of the Clean Water Act and implementing regulations or by the requirements of the approved State Pretreatment Program, as appropriate.
(2) All Permits subject to the requirements of paragraph (d)(1) of this section which do not contain the modification clause referred to in that paragraph will be subject to objection by EPA under section 402(d) of the Act as being outside the guidelines and requirements of the Act.

(3) Permits issued by an NPDES State after the Submission deadline for State Pretreatment Program approval (set forth in paragraph (b) of this section) shall contain conditions of an approved Pretreatment Program or a compliance schedule for developing such a program in accordance with §§ 403.8 (b) and (d) and 403.12(k).

(e) State Program in lieu of POTW Program. Notwithstanding the provision of § 403.8(a), a State with an approved Pretreatment Program may assume responsibility for implementing the POTW Pretreatment Program requirements set forth in § 403.8(f) in lieu of requiring the POTW to develop a Pretreatment Program. However, this does not preclude POTW's from independently developing Pretreatment Programs.

(f) State Pretreatment Program requirements. In order to be approved, a request for State Pretreatment Program Approval must demonstrate that the State Pretreatment Program has the following elements:

(1) Legal authority. The Attorney General's Statement submitted in accordance with paragraph (g)(1)(i) of this section shall certify that the Director has authority under State law to operate and enforce the State Pretreatment Program to the extent required by this part and by 40 CFR 123.27. At a minimum, the Director shall have the authority to:

(i) Incorporate POTW Pretreatment Program conditions into permits issued to POTW's; require compliance by POTW's with these incorporated permit conditions; and require compliance by Industrial Users with Pretreatment Standards;

(ii) Ensure continuing compliance by POTW's with pretreatment conditions incorporated into the POTW Permit through review of monitoring reports submitted to the Director by the POTW in accordance with § 403.12 and ensure continuing compliance by Industrial Users with Pretreatment Standards through the review of self-monitoring reports submitted to the POTW or to the Director by the Industrial Users in accordance with § 403.12;

(iii) Carry out inspection, surveillance and monitoring procedures which will determine, independent of information supplied by the POTW, compliance or noncompliance by the OTW with pretreatment conditions incorporated into the POTW Permit; and carry out inspection, surveillance and monitoring procedures which will determine, independent of information supplied by the Industrial User, whether the Industrial User is in compliance with Pretreatment Standards;

(iv) Seek civil and criminal penalties, and injunctive relief, for noncompliance by the POTW with pretreatment conditions incorporated into the POTW Permit and for noncompliance with Pretreatment Standards by Industrial Users as set forth in § 403.8(f)(1)(vi). The Director shall have authority to seek judicial relief for noncompliance by Industrial Users even when the POTW has acted to seek such relief (e.g., if the POTW has sought a penalty which the Director finds to be insufficient);

(v) Approve and deny requests for approval of POTW Pretreatment Programs submitted by a POTW to the Director;

(vi) Deny and recommend approval of (but not approve) requests for Fundamentally Different Factors variances submitted by Industrial Users in accordance with the criteria and procedures set forth in § 403.13; and

(vii) Approve and deny requests for authority to modify categorical Pretreatment Standards to reflect removals achieved by the POTW in accordance with the criteria and procedures set forth in §§ 403.7, 403.9 and 403.11.

(2) Procedures. The Director shall have developed procedures to carry out the requirements of sections 307 (b) and (c), and 402(b)(1), 402(b)(2), 402(b)(8), and 402(b)(9) of the Act. At a minimum, these procedures shall enable the Director to:

(i) Identify POTW's required to develop Pretreatment Programs in accordance with § 403.8(a) and notify these POTW's of the need to develop a POTW Pretreatment Program. In the absence of a POTW Pretreatment Program, the State shall have procedures to carry out the activities set forth in § 403.8(f)(2);

(ii) Provide technical and legal assistance to POTW's in developing Pretreatment Programs;

(iii) Develop compliance schedules for inclusion in POTW Permits which set forth the shortest reasonable time schedule for the completion of tasks needed to implement a POTW Pretreatment Program. The final compliance date in these schedules shall be no later than July 1, 1983;
(iv) Sample and analyze:
(A) Influent and effluent of the POTW to identify, independent of information supplied by the POTW, compliance or noncompliance with pollutant removal levels set forth in the POTW permit (see § 403.7); and
(B) The contents of sludge from the POTW and methods of sludge disposal and use to identify, independent of information supplied by the POTW, compliance or noncompliance with requirements applicable to the selected method of sludge management;
(v) Investigate evidence of violations of pretreatment conditions set forth in the POTW Permit by taking samples and acquiring other information as needed. This data acquisition shall be performed with sufficient care as to produce evidence admissible in an enforcement proceeding or in court;
(vi) Review and approve requests for approval of POTW Pretreatment Programs and authority to modify categorical Pretreatment Standards submitted by a POTW to the Director; and
(vii) Consider requests for Fundamentally Different Factors variances submitted by Industrial Users in accordance with the criteria and procedures set forth in § 403.13.
(3) Funding. The Director shall assure that funding and qualified personnel are available to carry out the authorities and procedures described in paragraphs (f)(1) and (2) of this section.
(g) Content of State Pretreatment Program submission. The request for State Pretreatment Program approval will consist of:
(1)(i) A statement from the State Attorney General (or the Attorney for those State agencies which have independent legal counsel) that the laws of the State provide adequate authority to implement the requirements of this part. The authorities cited by the Attorney General in this statement shall be in the form of lawfully adopted State statutes or regulations which shall be effective by the time of approval of the State Pretreatment Program; and
(ii) Copies of all State statutes and regulations cited in the above statement;
(iii) States with approved Pretreatment Programs shall establish Pretreatment regulations by November 16, 1989, unless the State would be required to enact or amend statutory provision, in which case, such regulations must be established by November 16, 1990.
(2) A description of the funding levels and full- and part-time personnel available to implement the program; and
(3) Any modifications or additions to the Memorandum of Agreement (required by 40 CFR 123.24) which may be necessary for EPA and the State to implement the requirements of this part.
(h) EPA Action. Any approved NPDES State requesting State Pretreatment Program approval shall submit to the Regional Administrator three copies of the Submission described in paragraph (g) of this section. Upon a preliminary determination that the Submission meets the requirements of paragraph (g) the Regional Administrator shall:
(1) Notify the Director that the Submission has been received and is under review; and
(2) Commence the program revision process set out in 40 CFR 123.62. For purposes of that section all requests for approval of State Pretreatment Programs shall be deemed substantial program modifications. A comment period of at least 30 days and the opportunity for a hearing shall be afforded the public on all such proposed program revisions.
(i) Notification where submission is defective. If, after review of the Submission as provided for in paragraph (h) of this section, EPA determines that the Submission does not comply with the requirements of paragraph (f) or (g) of this section EPA shall so notify the applying NPDES State in writing. This notification shall identify any defects in the Submission and advise the NPDES State of the means by which it can comply with the requirements of this part.

(Information collection requirements are approved by the Office of Management and Budget under control number 2040-0009)
Source
[46 FR 9439, Jan. 28, 1981, as amended at 51 FR 20429, June 4, 1986; 53 FR 40612, Oct. 17, 1988; 55 FR 30131, July 24, 1990; 58 FR 18017, Apr. 7, 1993; 60 FR 33932, June 29, 1995]

§ 403.11 Approval procedures for POTW pretreatment programs and POTW granting of removal credits.
Text
The following procedures shall be adopted in approving or denying requests for approval of POTW Pretreatment Programs and applications for removal credit authorization:
(a) Deadline for review of submission. The Approval Authority shall have 90 days from the date of public notice of any Submission complying with the requirements of § 403.9(b) and, where removal credit authorization is sought with §§ 403.7(e) and 403.9(d), to review the Submission. The Approval Authority shall review the Submission to determine compliance with the requirements of § 403.8 (b) and (f), and, where removal credit authorization is sought, with § 403.7. The Approval Authority may have up to an additional 90 days to complete the evaluation of the Submission if the public comment period provided for in paragraph (b)(1)(ii) of this section is extended beyond 30 days or if a public hearing is held as provided for in paragraph (b)(2) of this section. In no event, however, shall the time for evaluation of the Submission exceed a total of 180 days from the date of public notice of a Submission meeting the requirements of § 403.9(b) and, in the case of a removal credit application, §§ 403.7(e) and 403.9(b).
(b) Public notice and opportunity for hearing. Upon receipt of a Submission the Approval Authority shall commence its review. Within 20 work days after making a determination that a Submission meets the requirements of § 403.9(b) and, where removal allowance approval is sought, §§ 403.7(d) and 403.9(d), the Approval Authority shall:
(1) Issue a public notice of request for approval of the Submission;
(i) This public notice shall be circulated in a manner designed to inform interested and potentially interested persons of the Submission. Procedures for the circulation of public notice shall include:
(A) Mailing notices of the request for approval of the Submission to designated 208 planning agencies, Federal and State fish, shellfish and wildfish resource agencies (unless such agencies have asked not to be sent the notices); and to any other person or group who has requested individual notice, including those on appropriate mailing lists; and
(B) Publication of a notice of request for approval of the Submission in a newspaper(s) of general circulation within the jurisdiction(s) served by the POTW that meaningful public notice.
(ii) The public notice shall provide a period of not less than 30 days following the date of the public notice during which time interested persons may submit their written views on the Submission.
(iii) All written comments submitted during the 30 day comment period shall be retained by the Approval Authority and considered in the decision on whether or not to approve the Submission. The period for comment may be extended at the discretion of the Approval Authority; and
(2) Provide an opportunity for the applicant, any affected State, any interested State or Federal agency, person or group of persons to request a public hearing with respect to the Submission.
(i) This request for public hearing shall be filed within the 30 day (or extended) comment period described in paragraph (b)(1)(ii) of this section and shall indicate the interest of the person filing such request and the reasons why a hearing is warranted.
(ii) The Approval Authority shall hold a hearing if the POTW so requests. In addition, a hearing will be held if there is a significant public interest in issues relating to whether or not the Submission should be approved. Instances of doubt should be resolved in favor of holding the hearing.

(iii) Public notice of a hearing to consider a Submission and sufficient to inform interested parties of the nature of the hearing and the right to participate shall be published in the same newspaper as the notice of the original request for approval of the Submission under paragraph (b)(1)(i)(B) of this section. In addition, notice of the hearing shall be sent to those persons requesting individual notice.
(c) Approval authority decision. At the end of the 30 day (or extended) comment period and within the 90 day (or extended) period provided for in paragraph (a) of this section, the Approval Authority shall approve or deny the Submission based upon the evaluation in paragraph (a) of this section and taking into consideration comments submitted during the comment period and the record of the public hearing, if held. Where the Approval Authority makes a determination to deny the request, the Approval Authority shall so notify the POTW and each person who has requested individual notice. This notification shall include suggested modifications and the Approval Authority may allow the requestor additional time to bring the Submission into compliance with applicable requirements.
(d) EPA objection to Director's decision. No POTW pretreatment program or authorization to grant removal allowances shall be approved by the Director if following the 30 day (or extended) evaluation period provided for in paragraph (b)(1)(ii) of this section and any hearing held pursuant to paragraph (b)(2) of this section the Regional Administrator sets forth in writing objections to the approval of such Submission and the reasons for such objections. A copy of the Regional Administrator's objections shall be provided to the applicant, and each person who has requested individual notice. The Regional Administrator shall provide an opportunity for written comments and may convene a public hearing on his or her objections. Unless retracted, the Regional Administrator's objections shall constitute a final ruling to deny approval of a POTW pretreatment program or authorization to grant removal allowances 90 days after the date the objections are issued.
(e) Notice of decision. The Approval Authority shall notify those persons who submitted comments and participated in the public hearing, if held, of the approval or disapproval of the Submission. In addition, the Approval Authority shall cause to be published a notice of approval or disapproval in the same newspapers as the original notice of request for approval of the Submission was published. The Approval Authority shall identify in any notice of POTW Pretreatment Program approval any authorization to modify categorical Pretreatment Standards which the POTW may make, in accordance with § 403.7, for removal of pollutants subject to Pretreatment Standards.
(f) Public access to submission. The Approval Authority shall ensure that the Submission and any comments upon such Submission are available to the public for inspection and copying.
Source
[46 FR 9439, Jan. 28, 1981, as amended at 49 FR 31224, Aug. 3, 1984; 51 FR 20429, June 4, 1986; 53 FR 40613, Oct. 17, 1988; 62 FR 38406, 38414, July 17, 1997]

Notes
[EFFECTIVE DATE NOTE: 62 FR 38406, 38414, July 17, 1997, revised paragraphs (b)(1)(i)(A) and (B), effective Aug. 18, 1997.]

§ 403.12 Reporting requirements for POTW's and industrial users.

(a) Definition. The term Control Authority as it is used in this section refers to: (1) The POTW if the POTW's Submission for its pretreatment program (§ 403.3(t)(1)) has been approved in accordance with the requirements of § 403.11; or (2) the Approval Authority if the Submission has not been approved.
(b) Reporting requirements for industrial users upon effective date of categorical pretreatment standard -- baseline report. Within 180 days after the effective date of a categorical Pretreatment Standard, or 180 days after the final administrative decision made upon a

category determination submission under § 1A403.6(a)(4), whichever is later, existing Industrial Users subject to such categorical Pretreatment Standards and currently discharging to or scheduled to discharge to a POTW shall be required to submit to the Control Authority a report which contains the information listed in paragraphs (b)(1)-(7) of this section. At least 90 days prior to commencement of discharge, New Sources, and sources that become Industrial Users subsequent to the promulgation of an applicable categorical Standard, shall be required to submit to the Control Authority a report which contains the information listed in paragraphs (b)(1)-(5) of this section. New sources shall also be required to include in this report information on the method of pretreatment the source intends to use to meet applicable pretreatment standards. New Sources shall give estimates of the information requested in paragraphs (b) (4) and (5) of this section:

(1) Identifying information. The User shall submit the name and address of the facility including the name of the operator and owners;

(2) Permits. The User shall submit a list of any environmental control permits held by or for the facility;

(3) Description of operations. The User shall submit a brief description of the nature, average rate of production, and Standard Industrial Classification of the operation(s) carried out by such Industrial User. This description should include a schematic process diagram which indicates points of Discharge to the POTW from the regulated processes.

(4) Flow measurement. The User shall submit information showing the measured average daily and maximum daily flow, in gallons per day, to the POTW from each of the following:

(i) Regulated process streams; and

(ii) Other streams as necessary to allow use of the combined wastestream formula of § 403.6(e). (See paragraph (b)(5)(v) of this section.)

The Control Authority may allow for verifiable estimates of these flows where justified by cost or feasibility considerations.

(5) Measurement of pollutants. (i) The user shall identify the Pretreatment Standards applicable to each regulated process;

(ii) In addition, the User shall submit the results of sampling and analysis identifying the nature and concentration (or mass, where required by the Standard or Control Authority) of regulated pollutants in the Discharge from each regulated process. Both daily maximum and average concentration (or mass, where required) shall be reported. The sample shall be representative of daily operations;

(iii) A minimum of four (4) grab samples must be used for pH, cyanide, total phenols, oil and grease, sulfide, and volatile organics. For all other pollutants, 24-hour composite samples must be obtained through flow-proportional composite sampling techniques where feasible. The Control Authority may waive flow-proportional composite sampling for any Industrial User that demonstrates that flow-proportional sampling is infeasible. In such cases, samples may be obtained through time-proportional composite sampling techniques or through a minimum of four (4) grab samples where the User demonstrates that this will provide a representative sample of the effluent being discharged.

(iv) The User shall take a minimum of one representative sample to compile that data necessary to comply with the requirements of this paragraph.

(v) Samples should be taken immediately downstream from pretreatment facilities if such exist or immediately downstream from the regulated process if no pretreatment exists. If other wastewaters are mixed with the regulated wastewater prior to pretreatment the User should measure the flows and concentrations necessary to allow use of the combined wastestream formula of § 403.6(e) in order to evaluate compliance with the Pretreatment Standards. Where an alternate concentration or mass limit has been calculated in accordance with § 403.6(e) this adjusted limit along with supporting data shall be submitted to the Control Authority;

(vi) Sampling and analysis shall be performed in accordance with the techniques prescribed in 40 CFR part 136 and amendments thereto. Where 40 CFR part 136 does not contain sampling

or analytical techniques for the pollutant in question, or where the Administrator determines that the part 136 sampling and analytical techniques are inappropriate for the pollutant in question, sampling and analysis shall be performed by using validated analytical methods or any other applicable sampling and analytical procedures, including procedures suggested by the POTW or other parties, approved by the Administrator;
(vii) The Control Authority may allow the submission of a baseline report which utilizes only historical data so long as the data provides information sufficient to determine the need for industrial pretreatment measures;
(viii) The baseline report shall indicate the time, date and place, of sampling, and methods of analysis, and shall certify that such sampling and analysis is representative of normal work cycles and expected pollutant Discharges to the POTW;
(6) Certification. A statement, reviewed by an authorized representative of the Industrial User (as defined in paragraph (k) of this section) and certified to by a qualified professional, indicating whether Pretreatment Standards are being met on a consistent basis, and, if not, whether additional operation and maintenance (O and M) and/or additional pretreatment is required for the Industrial User to meet the Pretreatment Standards and Requirements; and
(7) Compliance schedule. If additional pretreatment and/or O and M will be required to meet the Pretreatment Standards; the shortest schedule by which the Industrial User will provide such additional pretreatment and/or O and M. The completion date in this schedule shall not be later than the compliance date established for the applicable Pretreatment Standard.
(i) Where the Industrial User's categorical Pretreatment Standard has been modified by a removal allowance (§ 403.7), the combined wastestream formula (§ 1A403.6(e)), and/or a Fundamentally Different Factors variance (§ 403.13) at the time the User submits the report required by paragraph (b) of this section, the information required by paragraphs (b)(6) and (7) of this section shall pertain to the modified limits.
(ii) If the categorical Pretreatment Standard is modified by a removal allowance (§ 403.7), the combined wastestream formula (§ 403.6(e)), and/or a Fundamentally Different Factors variance (§ 403.13) after the User submits the report required by paragraph (b) of this section, any necessary amendments to the information requested by paragraphs (b)(6) and (7) of this section shall be submitted by the User to the Control Authority within 60 days after the modified limit is approved.
(c) Compliance schedule for meeting categorical Pretreatment Standards. T1The following conditions shall apply to the schedule required by paragraph (b)(7) of this section:
(1) The schedule shall contain increments of progress in the form of dates for the commencement and completion of major events leading to the construction and operation of additional pretreatment required for the Industrial User to meet the applicable categorical Pretreatment Standards (e.g., hiring an engineer, completing preliminary plans, completing final plans, executing contract for major components, commencing construction, completing construction, etc.).
(2) No increment referred to in paragraph (c)(1) of this section shall exceed 9 months.
(3) Not later than 14 days following each date in the schedule and the final date for compliance, the Industrial User shall submit a progress report to the Control Authority including, at a minimum, whether or not it complied with the increment of progress to be met on such date and, if not, the date on which it expects to comply with this increment of progress, the reason for delay, and the steps being taken by the Industrial User to return the construction to the schedule established. In no event shall more than 9 months elapse between such progress reports to the Control Authority.
(d) Report on compliance with categorical pretreatment standard deadline. Within 90 days following the date for final compliance with applicable categorical Pretreatment Standards or in the case of a New Source following commencement of the introduction of wastewater into the POTW, any Industrial User subject to Pretreatment Standards and Requirements shall submit to the Control Authority a report containing the information described in paragraphs (b) (4)-(6) of

this section. For Industrial Users subject to equivalent mass or concentration limits established by the Control Authority in accordance with the procedures in § 403.6(c), this report shall contain a reasonable measure of the User's long term production rate. For all other Industrial Users subject to categorical Pretreatment Standards expressed in terms of allowable pollutant discharge per unit of production (or other measure of operation), this report shall include the User's actual production during the appropriate sampling period.

(e) Periodic reports on continued compliance. (1) Any Industrial User subject to a categorical Pretreatment Standard, after the compliance date of such Pretreatment Standard, or, in the case of a New Source, after commencement of the discharge into the POTW, shall submit to the Control Authority during the months of June and December, unless required more frequently in the Pretreatment Standard or by the Control Authority or the Approval Authority, a report indicating the nature and concentration of pollutants in the effluent which are limited by such categorical Pretreatment Standards. In addition, this report shall include a record of measured or estimated average and maximum daily flows for the reporting period for the Discharge reported in paragraph (b)(4) of this section except that the Control Authority may require more detailed reporting of flows. At the discretion of the Control Authority and in consideration of such factors as local high or low flow rates, holidays, budget cycles, etc., the Control Authority may agree to alter the months during which the above reports are to be submitted.

(2) Where the Control Authority has imposed mass limitations on Industrial Users as provided for by § 403.6(d), the report required by paragraph (e)(1) of this section shall indicate the mass of pollutants regulated by Pretreatment Standards in the Discharge from the Industrial User.

(3) For Industrial Users subject to equivalent mass or concentration limits established by the Control Authority in accordance with the procedures in § 403.6(c), the report required by paragraph (e)(1) shall contain a reasonable measure of the User's long term production rate. For all other Industrial Users subject to categorical Pretreatment Standards expressed only in terms of allowable pollutant discharge per unit of production (or other measure of operation), the report required by paragraph (e)(1) shall include the User's actual average production rate for the reporting period.

(f) Notice of potential problems, including slug loading. All categorical and non-categorical Industrial Users shall notify the POTW immediately of all discharges that could cause problems to the POTW, including any slug loadings, as defined by § 403.5(b), by the Industrial User.

(g) Monitoring and analysis to demonstrate continued compliance. (1) The reports required in paragraphs (b), (d), and (e) of this section shall contain the results of sampling and an analysis of the Discharge, including the flow and the nature and concentration, or production and mass where requested by the Control Authority, of pollutants contained therein which are limited by the applicable Pretreatment Standards. This sampling and analysis may be performed by the Control Authority in lieu of the Industrial User. Where the POTW performs the required sampling and analysis in lieu of the Industrial User, the User will not be required to submit the compliance certification required under §§ 403.12(b) (6) and 403.12(d). In addition, where the POTW itself collects all the information required for the report, including flow data, the Industrial User will not be required to submit the report.

(2) If sampling performed by an Industrial User indicates a violation, the user shall notify the Control Authority within 24 hours of becoming aware of the violation. The User shall also repeat the sampling and analysis and submit the results of the repeat analysis to the Control Authority within 30 days after becoming aware of the violation, except the Industrial User is not required to resample if:

(i) The Control Authority performs sampling at the Industrial User at a frequency of at least once per month, or

(ii) The Control Authority performs sampling at the User between the time when the User performs its initial sampling and the time when the User receives the results of this sampling.

(3) The reports required in paragraph (e) of this section shall be based upon data obtained through appropriate sampling and analysis performed during the period covered by the report,

which data is representative of conditions occurring during the reporting period. The Control Authority shall require that frequency of monitoring necessary to assess and assure compliance by Industrial Users with applicable Pretreatment Standards and Requirements.

(4) All analyses shall be performed in accordance with procedures established by the Administrator pursuant to section 304(h) of the Act and contained in 40 CFR part 136 and amendments thereto or with any other test procedures approved by the Administrator. (See, §§ 136.4 and 136.5.) Sampling shall be performed in accordance with the techniques approved by the Administrator. Where 40 CFR part 136 does not include sampling or analytical techniques for the pollutants in question, or where the Administrator determines that the part 136 sampling and analytical techniques are inappropriate for the pollutant in question, sampling and analyses shall be performed using validated analytical methods or any other sampling and analytical procedures, including procedures suggested by the POTW or other parties, approved by the Administrator.

(5) If an Industrial User subject to the reporting requirement in paragraph (e) of this section monitors any pollutant more frequently than required by the Control Authority, using the procedures prescribed in paragraph (g)(4) of this section, the results of this monitoring shall be included in the report.

(h) Reporting requirements for Industrial Users not subject to categorical Pretreatment Standards. The Control Authority shall require appropriate reporting from those Industrial Users with discharges that are not subject to categorical Pretreatment Standards. Significant Noncategorical Industrial Users shall submit to the Control Authority at least once every six months (on dates specified by the Control Authority) a description of the nature, concentration, and flow of the pollutants required to be reported by the Control Authority. These reports shall be based on sampling and analysis performed in the period covered by the report, and performed in accordance with the techniques described in 40 CFR part 136 and amendments thereto. Where 40 CFR part 136 does not contain sampling or analytical techniques for the pollutant in question, or where the Administrator determines that the part 136 sampling and analytical techniques are inappropriate for the pollutant in question, sampling and analysis shall be performed by using validated analytical methods or any other applicable sampling and analytical procedures, including procedures suggested by the POTW or other persons, approved by the Administrator. This sampling and analysis may be performed by the Control Authority in lieu of the significant noncategorical industrial user. Where the POTW itself collects all the information required for the report, the noncategorical significant industrial user will not be required to submit the report.

(i) Annual POTW reports. POTWs with approved Pretreatment Programs shall provide the Approval Authority with a report that briefly describes the POTW's program activities, including activities of all participating agencies, if more than one jurisdiction is involved in the local program. The report required by this section shall be submitted no later than one year after approval of the POTW's Pretreatment Program, and at least annually thereafter, and shall include, at a minimum, the following:

(1) An updated list of the POTW's Industrial Users, including their names and addresses, or a list of deletions and additions keyed to a previously submitted list. The POTW shall provide a brief explanation of each deletion. This list shall identify which Industrial Users are subject to categorical pretreatment Standards and specify which Standards are applicable to each Industrial User. The list shall indicate which Industrial Users are subject to local standards that are more stringent than the categorical Pretreatment Standards. The POTW shall also list the Industrial Users that are subject only to local Requirements.

(2) A summary of the status of Industrial User compliance over the reporting period;

(3) A summary of compliance and enforcement activities (including inspections) conducted by the POTW during the reporting period;

(4) A summary of changes to the POTW's pretreatment program that have not been previously reported to the Approval Authority; and

(5) Any other relevant information requested by the Approval Authority.
(j) Notification of changed discharge. All Industrial Users shall promptly notify the POTW in advance of any substantial change in the volume or character of pollutants in their discharge, including the listed or characteristic hazardous wastes for which the Industrial User has submitted initial notification under 40 CFR 403.12(p).
(k) Compliance schedule for POTW's. The following conditions and reporting requirements shall apply to the compliance schedule for development of an approvable POTW Pretreatment Program required by § 403.8.
(1) The schedule shall contain increments of progress in the form of dates for the commencement and completion of major events leading to the development and implementation of a POTW Pretreatment Program (e.g., acquiring required authorities, developing funding mechanisms, acquiring equipment);
(2) No increment referred to in paragraph (h)(1) of this section shall exceed nine months;
(3) Not later than 14 days following each date in the schedule and the final date for compliance, the POTW shall submit a progress report to the Approval Authority including, as a minimum, whether or not it complied with the increment of progress to be met on such date and, if not, the date on which it expects to comply with this increment of progress, the reason for delay, and the steps taken by the POTW to return to the schedule established. In no event shall more than nine months elapse between such progress reports to the Approval Authority.
(l) Signatory requirements for industrial user reports. The reports required by paragraphs (b), (d), and (e) of this section shall include the certification statement as set forth in § 403.6(a)(2)(ii), and shall be signed as follows:
(1) By a responsible corporate officer, if the Industrial User submitting the reports required by paragraphs (b), (d) and (e) of this section is a corporation. For the purpose of this paragraph, a responsible corporate officer means (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operation facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $ 25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
(2) By a general partner or proprietor if the Industrial User submitting the reports required by paragraphs (b), (d) and (e) of this section is a partnership or sole proprietorship respectively.
(3) By a duly authorized representative of the individual designated in paragraph (l)(1) or (l)(2) of this section if:
(i) The authorization is made in writing by the individual described in paragraph (l)(1) or (l)(2);
(ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the facility from which the Industrial Discharge originates, such as the position of plant manager, operator of a well, or well field superintendent, or a position of equivalent responsibility, or having overall responsibility for environmental matters for the company; and
(iii) the written authorization is submitted to the Control Authority.
(4) If an authorization under paragraph (l)(3) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, or overall responsibility for environmental matters for the company, a new authorization satisfying the requirements of paragraph (l)(3) of this section must be submitted to the Control Authority prior to or together with any reports to be signed by an authorized representative.
(m) Signatory requirements for POTW reports. Reports submitted to the Approval Authority by the POTW in accordance with paragraph (h) of this section must be signed by a principal executive officer, ranking elected official or other duly authorized employee if such employee is responsible for overall operation of the POTW.

(n) Provisions Governing Fraud and False Statements: The reports and other documents required to be submitted or maintained under this section shall be subject to:
(1) The provisions of 18 U.S.C. section 1001 relating to fraud and false statements;
(2) The provisions of sections 309(c)(4) of the Act, as amended, governing false statements, representation or certification; and
(3) The provisions of section 309(c)(6) regarding responsible corporate officers.
(o) Record-keeping requirements. (1) Any Industrial User and POTW subject to the reporting requirements established in this section shall maintain records of all information resulting from any monitoring activities required by this section. Such records shall include for all samples:
(i) The date, exact place, method, and time of sampling and the names of the person or persons taking the samples;
(ii) The dates analyses were performed;
(iii) Who performed the analyses;
(iv) The analytical techniques/methods use; and
(v) The results of such analyses.
(2) Any Industrial User or POTW subject to the reporting requirements established in this section shall be required to retain for a minimum of 3 years any records of monitoring activities and results (whether or not such monitoring activities are required by this section) and shall make such records available for inspection and copying by the Director and the Regional Administrator (and POTW in the case of an Industrial User). This period of retention shall be extended during the course of any unresolved litigation regarding the Industrial User or POTW or when requested by the Director or the Regional Administrator.
(3) Any POTW to which reports are submitted by an Industrial User pursuant to paragraphs (b), (d), (e), and (h) of this section shall retain such reports for a minimum of 3 years and shall make such reports available for inspection and copying by the Director and the Regional Administrator. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the Industrial User or the operation of the POTW Pretreatment Program or when requested by the Director or the Regional Administrator.
(p)(1) The Industrial User shall notify the POTW, the EPA Regional Waste Management Division Director, and State hazardous waste authorities in writing of any discharge into the POTW of a substance, which, if otherwise disposed of, would be a hazardous waste under 40 CFR part 261. Such notification must include the name of the hazardous waste as set forth in 40 CFR part 261, the EPA hazardous waste number, and the type of discharge (continuous, batch, or other). If the Industrial User discharges more than 100 kilograms of such waste per calendar month to the POTW, the notification shall also contain the following information to the extent such information is known and readily available to the Industrial User: An identification of the hazardous constituents contained in the wastes, an estimation of the mass and concentration of such constituents in the wastestream discharged during that calendar month, and an estimation of the mass of constituents in the wastestream expected to be discharged during the following twelve months. All notifications must take place within 180 days of the effective date of this rule. Industrial users who commence discharging after the effective date of this rule shall provide the notification no later than 180 days after the discharge of the listed or characteristic hazardous waste. Any notification under this paragraph need be submitted only once for each hazardous waste discharged. However, notifications of changed discharges must be submitted under 40 CFR 403.12 (j). The notification requirement in this section does not apply to pollutants already reported under the self-monitoring requirements of 40 CFR 403.12 (b), (d), and (e).
(2) Dischargers are exempt from the requirements of paragraph (p)(1) of this section during a calendar month in which they discharge no more than fifteen kilograms of hazardous wastes, unless the wastes are acute hazardous wastes as specified in 40 CFR 261.30(d) and 261.33(e). Discharge of more than fifteen kilograms of non-acute hazardous wastes in a calendar month, or of any quantity of acute hazardous wastes as specified in 40 CFR 261.30(d) and 261.33(e), requires a one-time notification.

Subsequent months during which the Industrial User discharges more than such quantities of any hazardous waste do not require additional notification.
(3) In the case of any new regulations under section 3001 of RCRA identifying additional characteristics of hazardous waste or listing any additional substance as a hazardous waste, the Industrial User must notify the POTW, the EPA Regional Waste Management Waste Division Director, and State hazardous waste authorities of the discharge of such substance within 90 days of the effective date of such regulations.
(4) In the case of any notification made under paragraph (p) of this section, the Industrial User shall certify that it has a program in place to reduce the volume and toxicity of hazardous wastes generated to the degree it has determined to be economically practical.
Source
[46 FR 9439, Jan. 28, 1981, as amended at 49 FR 31225, Aug. 3, 1984; 51 FR 20429, June 4, 1986; 53 FR 40613, Oct. 17, 1988; 55 FR 30131, July 24, 1990; 58 FR 18017, Apr. 7, 1993; 60 FR 33932, June 29, 1995; 62 FR 38406, 38414, July 17, 1997]

Notes
[EFFECTIVE DATE NOTE: 62 FR 38406, 38414, July 17, 1997, redesignated paragraph (i)(4) as paragraph (i)(5), revised paragraph (i)(3), and added a new paragraph (i)(4), effective Aug. 18, 1997.]

§ 403.13 Variances from categorical pretreatment standards for fundamentally different factors.

(a) Definition. The term Requester means an Industrial User or a POTW or other interested person seeking a variance from the limits specified in a categorical Pretreatment Standard.
(b) Purpose and scope. In establishing categorical Pretreatment Standards for existing sources, the EPA will take into account all the information it can collect, develop and solicit regarding the factors relevant to pretreatment standards under section 307(b). In some cases, information which may affect these Pretreatment Standards will not be available or, for other reasons, will not be considered during their development. As a result, it may be necessary on a case-by-case basis to adjust the limits in categorical Pretreatment Standards, making them either more or less stringent, as they apply to a certain Industrial User within an industrial category or subcategory. This will only be done if data specific to that Industrial User indicates it presents factors fundamentally different from those considered by EPA in developing the limit at issue. Any interested person believing that factors relating to an Industrial User are fundamentally different from the factors considered during development of a categorical Pretreatment Standard applicable to that User and further, that the existence of those factors justifies a different discharge limit than specified in the applicable categorical Pretreatment Standard, may request a fundamentally different factors variance under this section or such a variance request may be initiated by the EPA.
(c) Criteria -- (1) General criteria. A request for a variance based upon fundamentally different factors shall be approved only if:
(i) There is an applicable categorical Pretreatment Standard which specifically controls the pollutant for which alternative limits have been requested; and
(ii) Factors relating to the discharge controlled by the categorical Pretreatment Standard are fundamentally different from the factors considered by EPA in establishing the Standards; and
(iii) The request for a variance is made in accordance with the procedural requirements in paragraphs (g) and (h) of this section.
(2) Criteria applicable to less stringent limits. A variance request for the establishment of limits less stringent than required by the Standard shall be approved only if:
(i) The alternative limit requested is no less stringent than justified by the fundamental difference;

(ii) The alternative limit will not result in a violation of prohibitive discharge standards prescribed by or established under § 403.5;
(iii) The alternative limit will not result in a non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the Pretreatment Standards; and
(iv) Compliance with the Standards (either by using the technologies upon which the Standards are based or by using other control alternatives) would result in either:
(A) A removal cost (adjusted for inflation) wholly out of proportion to the removal cost considered during development of the Standards; or
(B) A non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the Standards.
(3) Criteria applicable to more stringent limits. A variance request for the establishment of limits more stringent than required by the Standards shall be approved only if:
(i) The alternative limit request is no more stringent than justified by the fundamental difference; and
(ii) Compliance with the alternative limit would not result in either:
(A) A removal cost (adjusted for inflation) wholly out of proportion to the removal cost considered during development of the Standards; or
(B) A non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the Standards.
(d) Factors considered fundamentally different. Factors which may be considered fundamentally different are:
(1) The nature or quality of pollutants contained in the raw waste load of the User's process wastewater:
(2) The volume of the User's process wastewater and effluent discharged;
(3) Non-water quality environmental impact of control and treatment of the User's raw waste load;
(4) Energy requirements of the application of control and treatment technology;
(5) Age, size, land availability, and configuration as they relate to the User's equipment or facilities; processes employed; process changes; and engineering aspects of the application of control technology;
(6) Cost of compliance with required control technology.
(e) Factors which will not be considered fundamentally different. A variance request or portion of such a request under this section may not be granted on any of the following grounds:
(1) The feasibility of installing the required waste treatment equipment within the time the Act allows;
(2) The assertion that the Standards cannot be achieved with the appropriate waste treatment facilities installed, if such assertion is not based on factors listed in paragraph (d) of this section;
(3) The User's ability to pay for the required waste treatment; or
(4) The impact of a Discharge on the quality of the POTW's receiving waters.
(f) State or local law. Nothing in this section shall be construed to impair the right of any state or locality under section 510 of the Act to impose more stringent limitations than required by Federal law.
(g) Application deadline. (1) Requests for a variance and supporting information must be submitted in writing to the Director or to the Administrator (or his delegate), as appropriate.
(2) In order to be considered, a request for a variance must be submitted no later than 180 days after the date on which a categorical Pretreatment Standard is published in the Federal Register.
(3) Where the User has requested a categorical determination pursuant to § 1A403.6(a), the User may elect to await the results of the category determination before submitting a variance request under this section. Where the User so elects, he or she must submit the variance

request within 30 days after a final decision has been made on the categorical determination pursuant to § 403.6(a)(4).

(h) Contents submission. Written submissions for variance requests, whether made to the Administrator (or his delegate) or the Director, must include:

(1) The name and address of the person making the request;

(2) Identification of the interest of the Requester which is affected by the categorical Pretreatment Standard for which the variance is requested;

(3) Identification of the POTW currently receiving the waste from the Industrial User for which alternative discharge limits are requested;

(4) Identification of the categorical Pretreatment Standards which are applicable to the Industrial User;

(5) A list of each pollutant or pollutant parameter for which an alternative discharge limit is sought;

(6) The alternative discharge limits proposed by the Requester for each pollutant or pollutant parameter identified in paragraph (h)(5) of this section;

(7) A description of the Industrial User's existing water pollution control facilities;

(8) A schematic flow representation of the Industrial User's water system including water supply, process wastewater systems, and points of Discharge; and

(9) A Statement of facts clearly establishing why the variance request should be approved, including detailed support data, documentation, and evidence necessary to fully evaluate the merits of the request, e.g., technical and economic data collected by the EPA and used in developing each pollutant discharge limit in the Pretreatment Standard.

(i) Deficient requests. The Administrator (or his delegate) or the Director will only act on written requests for variances that contain all of the information required. Persons who have made incomplete submissions will be notified by the Administrator (or his delegate) or the Director that their requests are deficient and unless the time period is extended, will be given up to thirty days to remedy the deficiency. If the deficiency is not corrected within the time period allowed by the Administrator (or his delegate) or the Director, the request for a variance shall be denied.

(j) Public notice. Upon receipt of a complete request, the Administrator (or his delegate) or the Director will provide notice of receipt, opportunity to review the submission, and opportunity to comment.

(1) The public notice shall be circulated in a manner designed to inform interested and potentially interested persons of the request. Procedures for the circulation of public notice shall include mailing notices to:

(i) The POTW into which the Industrial User requesting the variance discharges;

(ii) Adjoining States whose waters may be affected; and

(iii) Designated 208 planning agencies, Federal and State fish, shellfish and wildlife resource agencies; and to any other person or group who has requested individual notice, including those on appropriate mailing lists.

(2) The public notice shall provide for a period not less than 30 days following the date of the public notice during which time interested persons may review the request and submit their written views on the request.

(3) Following the comment period, the Administrator (or his delegate) or the Director will make a determination on the request taking into consideration any comments received. Notice of this final decision shall be provided to the requester (and the Industrial User for which the variance is requested if different), the POTW into which the Industrial User discharges and all persons who submitted comments on the request.

(k) Review of requests by state. (1) Where the Director finds that fundamentally different factors do not exist, he may deny the request and notify the requester (and Industrial User where they are not the same) and the POTW of the denial.

(2) Where the Director finds that fundamentally different factors do exist, he shall forward the request, with a recommendation that the request be approved, to the Administrator (or his delegate).
(l) Review of requests by EPA. (1) Where the Administrator (or his delegate) finds that fundamentally different factors do not exist, he shall deny the request for a variance and send a copy of his determination to the Director, to the POTW, and to the requester (and to the Industrial User, where they are not the same).
(2) Where the Administrator (or his delegate) finds that fundamentally different factors do exist, and that a partial or full variance is justified, he will approve the variance. In approving the variance, the Administrator (or his delegate) will:
(i) Prepare recommended alternative discharge limits for the Industrial User either more or less stringent than those prescribed by the applicable categorical Pretreatment Standard to the extent warranted by the demonstrated fundamentally different factors;
(ii) Provide the following information in his written determination:
(A) The recommended alternative discharge limits for the Industrial User concerned;
(B) The rationale for the adjustment of the Pretreatment Standard (including the reasons for recommending that the variance be granted) and an explanation of how the recommended alternative discharge limits were derived;
(C) The supporting evidence submitted to the Administrator (or his delegate); and
(D) Other information considered by the Administrator (or his delegate) in developing the recommended alternative discharge limits;
(iii) Notify the Director and the POTW of his or her determination; and
(iv) Send the information described in paragraphs (l)(2) (i) and (ii) of this section to the Requestor (and to the Industrial User where they are not the same).
(m) Request for hearing. (1) Within 30 days following the date of receipt of the notice of the decision of the Administrator's delegate on a variance request, the requester or any other interested person may submit a petition to the Regional Administrator for a hearing to reconsider or contest the decision. If such a request is submitted by a person other than the Industrial User the person shall simultaneously serve a copy of the request on the Industrial User.
(2) If the Regional Administrator declines to hold a hearing and the Regional Administrator affirms the findings of the Administrator's delegate the requester may submit a petition for a hearing to the Environmental Appeals Board (which is described in § 1.25 of this title) within 30 days of the Regional Administrator's decision.
(Information collection requirements are approved by the Office of Management and Budget under control number 2040-0009)
Source
[46 FR 9439, Jan. 28, 1981, as amended at 49 FR 5132, Feb. 10, 1984; 50 FR 38811, Sept. 25, 1985; 51 FR 16030, Apr. 30, 1986; 54 FR 258, Jan. 4, 1989; 57 FR 5347, Feb. 13, 1992; FR 18017, Apr. 7, 1993; 60 FR 33932, June 29, 1995]

§ 403.14 Confidentiality.

(a) EPA authorities. In accordance with 40 CFR part 2, any information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions, or, in the case of other submissions, by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR part 2 (Public Information).

(b) Effluent data. Information and data provided to the Control Authority pursuant to this part which is effluent data shall be available to the public without restriction.
(c) State or POTW. All other information which is submitted to the State or POTW shall be available to the public at least to the extent provided by 40 CFR 2.302.
Source
46 FR 9439, Jan. 28, 1981.

§ 403.15 Netgross calculation.

Categorical Pretreatment Standards may be adjusted to reflect the presence of pollutants in the Industrial User's intake water in accordance with this section.
(a) Application. Any Industrial User wishing to obtain credit for intake pollutants must make application to the Control Authority. Upon request of the Industrial User, the applicable Standard will be calculated on a "net" basis (i.e., adjusted to reflect credit for pollutants in the intake water) if the requirements of paragraphs (b) and (c) of this section are met.
(b) Criteria. (1) The Industrial User must demonstrate that the control system it proposes or uses to meet applicable categorical Pretreatment Standards would, if properly installed and operated, meet the Standards in the absence of pollutants in the intake waters.
(2) Credit for generic pollutants such as biochemical oxygen demand (BOD), total suspended solids (TSS), and oil and grease should not be granted unless the Industrial User demonstrates that the constituents of the generic measure in the User's effluent are substantially similar to the constituents of the generic measure in the intake water or unless appropriate additional limits are placed on process water pollutants either at the outfall or elsewhere.
(3) Credit shall be granted only to the extent necessary to meet the applicable categorical Pretreatment Standard(s), up to a maximum value equal to the influent value. Additional monitoring may be necessary to determine eligibility for credits and compliance with Standard(s) adjusted under this section.
(4) Credit shall be granted only if the User demonstrates that the intake water is drawn from the same body of water as that into which the POTW discharges. The Control Authority may waive this requirement if it finds that no environmental degradation will result.
(c) The applicable categorical pretreatment standards contained in 40 CFR subchapter N specifically provide that they shall be applied on a net basis.
(Information collection requirements are approved by the Office of Management and Budget under control number 2040-0009)
Source
[53 FR 40614, Oct. 17, 1988, as amended at 58 FR 18017, Apr. 7, 1993]

§ 403.16 Upset provision.

(a) Definition. For the purposes of this section, Upset means an exceptional incident in which there is unintentional and temporary noncompliance with categorical Pretreatment Standards because of factors beyond the reasonable control of the Industrial User. An Upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
(b) Effect of an upset. An Upset shall constitute an affirmative defense to an action brought for noncompliance with categorical Pretreatment Standards if the requirements of paragraph (c) are met.
(c) Conditions necessary for a demonstration of upset. An Industrial User who wishes to establish the affirmative defense of Upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
(1) An Upset occurred and the Industrial User can identify the cause(s) of the Upset;

(2) The facility was at the time being operated in a prudent and workman-like manner and in compliance with applicable operation and maintenance procedures;
(3) The Industrial User has submitted the following information to the POTW and Control Authority within 24 hours of becoming aware of the Upset (if this information is provided orally, a written submission must be provided within five days):
(i) A description of the Indirect Discharge and cause of noncompliance;
(ii) The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue;
(iii) Steps being taken and/or planned to reduce, eliminate and prevent recurrence of the noncompliance.
(d) Burden of proof. In any enforcement proceeding the Industrial User seeking to establish the occurrence of an Upset shall have the burden of proof.
(e) Reviewability of agency consideration of claims of upset. In the usual exercise of prosecutorial discretion, Agency enforcement personnel should review any claims that non-compliance was caused by an Upset. No determinations made in the course of the review constitute final Agency action subject to judicial review. Industrial Users will have the opportunity for a judicial determination on any claim of Upset only in an enforcement action brought for noncompliance with categorical Pretreatment Standards.
(f) User responsibility in case of upset. The Industrial User shall control production or all Discharges to the extent necessary to maintain compliance with categorical Pretreatment Standards upon reduction, loss, or failure of its treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost or fails.
Source
[46 FR 9439, Jan. 28, 1981, as amended at 53 FR 40615, Oct. 17, 1988]

§ 403.17 Bypass.

(a) Definitions. (1) Bypass means the intentional diversion of wastestreams from any portion of an Industrial User's treatment facility.
(2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
(b) Bypass not violating applicable Pretreatment Standards or Requirements. An Industrial User may allow any bypass to occur which does not cause Pretreatment Standards or Requirements to be violated, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of paragraphs (c) and (d) of this section.
(c) Notice. (1) If an Industrial User knows in advance of the need for a bypass, it shall submit prior notice to the Control Authority, if possible at least ten days before the date of the bypass.
(2) An Industrial User shall submit oral notice of an unanticipated bypass that exceeds applicable Pretreatment Standards to the Control Authority within 24 hours from the time the Industrial User becomes aware of the bypass. A written submission shall also be provided within 5 days of the time the Industrial User becomes aware of the bypass. The written submission shall contain a description of the bypass and its cause; the duration of the bypass, including exact dates and times, and, if the bypass has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass. The Control Authority may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.
(d) Prohibition of bypass. (1) Bypass is prohibited, and the Control Authority may take enforcement action against an Industrial User for a bypass, unless;
(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
(iii) The Industrial User submitted notices as required under paragraph (c) of this section.
(2) The Control Authority may approve an anticipated bypass, after considering its adverse effects, if the Control Authority determines that it will meet the three conditions listed in paragraph (d)(1) of this section.
(Information collection requirements are approved by the Office of Management and Budget under control number 2040-0009)
Source
[53 FR 40615, Oct. 17, 1988, as amended at 58 FR 18017, Apr. 7, 1993]

§ 403.18 Modification of POTW pretreatment programs.

(a) General. Either the Approval Authority or a POTW with an approved POTW Pretreatment Program may initiate program modification at any time to reflect changing conditions at the POTW. Program modification is necessary whenever there is a significant change in the operation of a POTW Pretreatment Program that differs from the information in the POTW's submission, as approved under § 403.11.
(b) Substantial modifications defined. Substantial modifications include:
(1) Modifications that relax POTW legal authorities (as described in § 403.8(f)(1)), except for modifications that directly reflect a revision to this Part 403 or to 40 CFR chapter I, subchapter N, and are reported pursuant to paragraph (d) of this section;
(2) Modifications that relax local limits, except for the modifications to local limits for pH and reallocations of the Maximum Allowable Industrial Loading of a pollutant that do not increase the total industrial loadings for the pollutant, which are reported pursuant to paragraph (d) of this section. Maximum Allowable Industrial Loading means the total mass of a pollutant that all Industrial Users of a POTW (or a subgroup of Industrial Users identified by the POTW) may discharge pursuant to limits developed under § 403.5(c);
(3) Changes to the POTW's control mechanism, as described in § 403.8(f)(1)(iii);
(4) A decrease in the frequency of self-monitoring or reporting required of industrial users;
(5) A decrease in the frequency of industrial user inspections or sampling by the POTW;
(6) Changes to the POTW's confidentiality procedures; and
(7) Other modifications designated as substantial modifications by the Approval Authority on the basis that the modification could have a significant impact on the operation of the POTW's Pretreatment Program; could result in an increase in pollutant loadings at the POTW; or could result in less stringent requirements being imposed on Industrial Users of the POTW.
(c) Approval procedures for substantial modifications.
(1) The POTW shall submit to the Approval Authority a statement of the basis for the desired program modification, a modified program description (see § 403.9(b)), or such other documents the Approval Authority determines to be necessary under the circumstances.
(2) The Approval Authority shall approve or disapprove the modification based on the requirements of § 403.8(f) and using the procedures in § 403.11(b) through (f), except as provided in paragraphs (c)(3) and (4) of this section. The modification shall become effective upon approval by the Approval Authority.
(3) The Approval Authority need not publish a notice of decision under § 403.11(e) provided: The notice of request for approval under § 403.11(b)(1) states that the request will be approved if no comments are received by a date specified in the notice; no substantive comments are received; and the request is approved without change.
(4) Notices required by § 403.11 may be performed by the POTW provided that the Approval Authority finds that the POTW notice otherwise satisfies the requirements of § 403.11.
(d) Approval procedures for non-substantial modifications.
(1) The POTW shall notify the Approval Authority of any non-substantial modification at least 45 days prior to implementation by the POTW, in a statement similar to that provided for in paragraph (c)(1) of this section.
(2) Within 45 days after the submission of the POTW's statement, the Approval Authority shall notify the POTW of its decision to approve or disapprove the non-substantial modification.
(3) If the Approval Authority does not notify the POTW within 45 days of its decision to approve or deny the modification, or to treat the modification as substantial under paragraph (b)(7) of this section, the POTW may implement the modification.
(e) Incorporation in permit. All modifications shall be incorporated into the POTW's NPDES permit upon approval. The permit will be modified to incorporate the approved modification in accordance with 40 CFR 122.63(g).
Source

[53 FR 40615, Oct. 17, 1988, as amended at 58 FR 18017, Apr. 7, 1993; 62 FR 38406, 38414, July 17, 1997]

Notes
[EFFECTIVE DATE NOTE: 62 FR 38406, 38414, July 17, 1997, revised this section, effective Aug. 18, 1997.]

§ 403.19 Provisions of specific applicability to the Owatonna Waste Water Treatment Facility.

(a) For the purposes of this section, the term "Participating Industrial Users" includes the following Industrial Users in the City of Owatonna, Minnesota: Crown Cork and Seal Company, Inc.; Cybex International Inc.; Josten's Inc. -- Southtown Facility; SPx Corporation, Service Solutions Division; Truth Hardware Corporation; and Uber Tanning Company.
(b) For a Participating Industrial User discharging to the Owatonna Waste Water Treatment Facility in Owatonna, Minnesota, when a categorical Pretreatment Standard is expressed in terms of pollutant concentration the City of Owatonna may convert the limit to a mass limit by multiplying the five-year, long-term average process flows of the Participating Industrial User (or a shorter period if production has significantly increased or decreased during the five year period) by the concentration-based categorical Pretreatment Standard. Participating Industrial Users must notify the City in the event production rates are expected to vary by more than 20 percent from a baseline production rate determined by Owatonna when it establishes a Participating Industrial User's initial mass limit. To remain eligible to receive equivalent mass limits the Participating Industrial User must maintain at least the same level of treatment as at the time the equivalent mass limit is established. Upon notification of a revised production rate from a Participating Industrial User, the City will reassess the appropriateness of the mass limit. Owatonna shall reestablish the concentration-based limit if a Participating Industrial User does not maintain at least the same level of treatment as when the equivalent mass limit was established.
(c) If a categorical Participating Industrial User of the Owatonna Waste Water Treatment Facility has demonstrated through sampling and other technical factors, including a comparison of three years of effluent data with background data, that pollutants regulated through categorical Pretreatment Standards, other than 40 CFR part 414, are not expected to be present in quantities greater than the background influent concentration to the industrial process, the City of Owatonna may reduce the sampling frequency specified in § 403.8(f)(2)(v) to once during the term of the categorical Participating Industrial User's permit.
(d) If a Participating Industrial User is discharging to the Owatonna Waste Water Treatment Facility in Owatonna, Minnesota and is subject to a categorical Pretreatment Standard other than one codified at 40 CFR part 414, the City of Owatonna may authorize the Participating Industrial User to forego sampling of a pollutant if the Participating Industrial User has demonstrated through sampling and other technical factors, including a comparison of three years of effluent data with background data, that the pollutant is not expected to be present in quantities greater than the background influent concentration to the industrial process, and the Participating Industrial User certifies on each report, with the following statement, that there has been no increase in the pollutant in its wastestream due to activities of the Participating Industrial User. The following statement is to be included as a comment to the periodic reports required by § 403.12(e):
"Based on my inquiry of the person or persons directly responsible for managing compliance with the pretreatment standard for 40 CFR -----, I certify that, to the best of my knowledge and belief, the raw materials, industrial processes, and potential by-products have not contributed this pollutant to the wastewaters since filing of the last periodic report under 40 CFR 403.12(e)."

(e) If the average daily loading from the Participating Industrial Users to the Owatonna Waste Water Treatment Facility is equal to or less than 0.68 pounds per day of chromium, 0.25 pounds per day of copper, 1.17 pounds per day of nickel, and 1.01 pounds per day of zinc, Owatonna may authorize a categorical Participating Industrial User to satisfy the reporting requirements of § 403.12(e) with an annual report provided on a date specified by Owatonna, provided that the Participating Industrial User has no reasonable potential to violate a Pretreatment Standard for any pollutant for which reduced monitoring is being allowed, and has not been in Significant Noncompliance within the previous three years.
(f) The Owatonna Waste Water Treatment Facility in Owatonna, Minnesota shall post public notice of all Significant Noncompliance subject to the publication requirement in § 403.8(f)(2)(vii) at the Minnesota Pollution Control Agency website for a period of one year, as soon as practicable upon identifying the violations. In addition, the Owatonna Waste Water Treatment Facility shall post an explanation of how Significant Noncompliance is determined, and a contact name and phone number for information regarding other, non-Significant Noncompliance violations. If a violation is not corrected within thirty (30) calendar days or results in pass through or interference at the Owatonna Waste Water Treatment Facility, publication must also be made in the format specified in § 403.8(f)(2)(vii).
(g) The provisions of this section shall expire on October 6, 2005.
Source
[65 FR 59738, 59747, Oct. 6, 2000]

Notes
[EFFECTIVE DATE NOTE: 65 FR 59738, 59747, Oct. 6, 2000, added this section, effective Oct. 6, 2000.]

§ 403.20 Pretreatment Program Reinvention Pilot Projects Under Project XL.

The Approval Authority may allow any publicly owned treatment works (POTW) that has a final "Project XL" agreement to implement a Pretreatment Program that includes legal authorities and requirements that are different than the administrative requirements otherwise applicable under this part. The POTW must submit any such alternative requirements as a substantial program modification in accordance with the procedures outlined in § 403.18. The approved modified program must be incorporated as an enforceable part of the POTW's NPDES permit. The Approval Authority must include a re-opener clause in the POTW's NPDES permit that directs the POTW to discontinue implementing the approved alternative requirements and resume implementation of its previously approved pretreatment program if the Approval Authority determines that the primary objectives of the Local Pilot Pretreatment Program are not being met or the "Project XL" agreement expires or is otherwise terminated.
Source
[66 FR 50334, 50339, Oct. 3, 2001]

Notes
[66 FR 50334, 50339, Oct. 3, 2001, added this section, effective Oct. 3, 2001.]

APPENDIX A TO PART 403 -- PROGRAM GUIDANCE MEMORANDUM

U.S. Environmental Protection Agency

Program Guidance Memorandum--61

Subject: Grants for Treatment and Control of Combined Sewer Overflows and Stormwater Discharges.

From: John T. Rhett, Deputy Assistant Administrator for Water Program Operations (WH-546).

To: Regional Administrators, Regions I-X.

This memorandum summarizes the Agency's policy on the use of construction grants for treatment and control of combined sewer overflows and stormwater discharges during wet-weather conditions. The purpose is to assure that projects are funded only when careful planning has demonstrated they are cost-effective.

I. Combined Sewer Overflows

A. Background

The costs and benefits of control of various portions of pollution due to combined sewer overflows and by-passes vary greatly with the characteristics of the sewer and treatment system, the duration, intensity, frequency and areal extent of precipitation, the type and extent of development in the service area, and the characteristics, uses and water quality standards of the receiving waters. Decisions on grants for control of combined sewer overflows, therefore, must be made on a case-by-case basis after detailed planning at the local level.

Where detailed planning has been completed, treatment or control of pollution from wet-weather overflows and bypasses may be given priority for construction grant funds only after provision has been made for secondary treatment of dry-weather flows in the area. The detailed planning requirements and criteria for project approval follow.

B. Planning Requirements

Construction grants may be approved for control of pollution from combined sewer overflows only if planning for the project was thoroughly analyzed for the 20 year planning period:

1. Alternative control techniques which might be utilized to attain various levels of pollution control (related to alternative beneficial uses, if appropriate), including at least initial consideration of all the alternatives described in the section on combined sewer and stormwater control in "Alternative Waste Management Techniques and Best Practicable Waste Treatment" (Section C of Chapter III of the information proposed for comment in March 1974).

2. The costs of achieving the various levels of pollution control by each of the techniques appearing to be the most feasible and cost-effective after the preliminary analysis.

3. The benefits to the receiving waters of a range of levels of pollution control during wet-weather conditions. This analysis will normally be conducted as part of State water quality management planning, 208 area wide management planning, or other State, regional or local planning effort.

4. The costs and benefits of addition of advanced waste treatment processes to dry-weather flows in the area.

C. Criteria for Project Approval

The final alternative selected shall meet the following criteria:

2. Provision has already been made for funding of secondary treatment of dry-weather flows in the area.

3. The pollution control technique proposed for combined sewer overflow is a more cost-effective means of protecting the beneficial use of the receiving waters than other combined sewer pollution control techniques and the addition of treatment higher than secondary treatment for dry-weather municipal flows in the area.

4. The marginal costs are not substantial compared to marginal benefits.

Marginal costs and benefits for each alternative may be displayed graphically to assist with determining a project's acceptability under this criterion. Dollar costs should be compared with quantified pollution reduction and water quality improvements. A descriptive narrative should also be included analyzing monetary, social and environmental costs compared to benefits, particularly the significance of the beneficial uses to be protected by the project.

II. Stormwater Discharges

Approaches for reducing pollution from separate stormwater discharges are now in the early stages of development and evaluation. We anticipate, however, that in many cases the benefits obtained by construction of treatment works for this purpose will be small compared with the costs, and other techniques of control and prevention will be more cost-effective. The policy of the Agency is, therefore, that construction grants shall not be used for construction of treatment works to control pollution from separate discharges of stormwater except under unusual conditions where the project clearly has been demonstrated to meet the planning requirements and criteria described above for combined sewer overflows.

III. Multi-purpose Projects

Projects with multiple purposes, such as flood control and recreation in addition to pollution control, may be eligible for an amount not to exceed the cost of the most cost-effective single purpose pollution abatement system. Normally the Separable Costs-Remaining Benefits (SCRB) method should be used to allocate costs between pollution control and other purposes, although in unusual cases another method may be appropriate. For such cost allocation, the cost of the least cost pollution abatement alternative may be used as a substitute measure of the benefits for that purpose. The method is described in "Proposed Practices for Economic Analysis of River Basin Projects," GPO, Washington, D.C., 1958, and "Efficiency in Government through Systems Analysis," by Roland N. McKean, John Wiley & Sons, Inc., 1958.

Enlargement of or otherwise adding to combined sewer conveyance systems is one means of reducing or eliminating flooding caused by wet-weather conditions. These additions may be designed so as to produce some benefits in terms of reduced discharge of pollutants to surrounding waterways. The pollution control benefits of such flood control measures, however, are likely to be small compared with the costs, and the measures therefore would normally be ineligible for funding under the construction grants program.

All multi-purpose projects where less than 100% of the costs are eligible for construction grants under this policy shall contain a special grant condition precluding EPA funding of non-pollution control elements. This condition should, as a minimum, contain a provision similar to the following:

Additional special conditions should be included as appropriate to assure that the grantee clearly understands which elements of the project are eligible for construction grants under Pub. L. 92-500.

Source

46 FR 9439, Jan. 28, 1981.

Notes

Sec. 54(c)(2) of the Clean Water Act of 1977, (Pub. L. 95-217) sections 204(b)(1)(C), 208(b)(2)(C)(iii), 301(b)(1)(A)(ii), 301(b)(2)(A)(ii), 301(b)(2)(C), 301(h)(5), 301(i)(2), 304(e), 304(g), 307, 308, 309, 402(b), 405 and 501(a) of the Federal Water Pollution Control Act (Pub. L. 92-500) as amended by the Clean Water Act of 1977 and the Water Quality Act of 1987 (Pub. L. 100-4).

APPENDIX B TO PART 403 [Reserved]

APPENDIX C TO PART 403 [Reserved]

APPENDIX D TO PART 403 -- SELECTED INDUSTRIAL SUBCATEGORIES EXEMPTED FROM REGULATION PURSUANT TO PARAGRAPH 8 OF THE NDRC v. Costle CONSENT DECREE

The following industrial subcategories are considered to have dilute wastestreams for purposes of the combined wastestream formula. They either were or could have been excluded from categorical pretreatment standards pursuant to paragraph 8 of the Natural Resources Defense Council, Inc., et al. v. Costle Consent Decree for one or more of the following four reasons: (1) The pollutants of concern are not detectable in the effluent from the industrial user (paragraph 8(a)(iii)); (2) the pollutants of concern are present only in trace amounts and are neither causing nor likely to cause toxic effects (paragraph 8(a)(iii)); (3) the pollutants of concern are present in amounts too small to be effectively reduced by technologies known to the Administrator (paragraph 8(a)(iii)); or (4) the wastestream contains only pollutants which are compatible with the POTW (paragraph 8(b)(i)). In some instances, different rationales were given for exclusion under paragraph 8. However, EPA has reviewed these subcategories and has determined that exclusion could have occurred due to one of the four reasons listed above.

This list is complete as of October 9, 1986. It will be updated periodically for the convenience of the reader.

Auto and Other Laundries (40 CFR Part 444)
Carpet and Upholstery Cleaning
Coin-Operated Laundries and Dry Cleaning
Diaper Services
Dry Cleaning Plants except Rug Cleaning
Industrial Laundries
Laundry and Garment Services, Not Elsewhere Classified
Linen Supply
Power Laundries, Family and Commercial

Electrical and Electronic Components 1 (40 CFR Part 469)
Capacitors (Fluid Fill)
Carbon and Graphite Products
Dry Transformers
Ferrite Electronic Devices
Fixed Capacitors
Fluorescent Lamps
Fuel Cells
Incandescent Lamps
Magnetic Coatings
Mica Paper Dielectric
Motors, Generators, Alternators
Receiving and Transmitting Tubes
Resistance Heaters
Resistors
Switchgear
Transformer (Fluid Fill)

1 The Paragraph 8 exemption for the manufacture of products in the Electrical and Electronic Components Category is for operations not covered by Electroplating/Metal Finishing pretreatment regulations (40 CFR Parts 413/433).

Metal Molding and Casting (40 CFR Part 464)
Nickel Casting
Tin Casting
Titanium Casting

Gum and Wood Chemicals (40 CFR Part 454)

Char and Charcoal Briquettes
Inorganic Chemicals Manufacturing (40 CFR Part 415)
Ammonium Chloride
Ammonium Hydroxide
Barium Carbonate
Calcium Carbonate
Carbon Dioxide
Carbon Monoxide and Byproduct Hydrogen
Hydrochloric Acid
Hydrogen Peroxide (Organic Process)
Nitric Acid
Oxygen and Nitrogen
Potassium Iodide
Sodium Chloride (Brine Mining Process)
Sodium Hydrosulfide
Sodium Hydrosulfite
Sodium Metal
Sodium Silicate
Sodium Thiosulfate
Sulfur Dioxide
Sulfuric Acid
Leather (40 CFR Part 425)
Gloves
Luggage
Paving and Roofing (40 CFR Part 443)
Asphalt Concrete
Asphalt Emulsion
Linoleum
Printed Asphalt Felt
Roofing
Pulp, Paper, and Paperboard, and Builders' Paper and Board Mills (40 CFR Parts 430 and 431)
Groundwood-Chemi-Mechanical
Rubber Manufacturing (40 CFR Part 428)
Tire and Inner Tube Plants
Emulsion Crumb Rubber
Solution Crumb Rubber
Latex Rubber
Small-sized General Molded, Extruded and Fabricated Rubber Plants, 2
Medium-sided General Molded, Extruded and Fabricated Rubber Plants 2
Large-sized General Molded, Extruded and Fabricated Rubber Plants 2
Wet Digestion Reclaimed Rubber
Pan, Dry Digestion, and Mechanical Reclaimed Rubber
Latex Dipped, Latex-Extruded, and Latex-Molded Rubber 3
Latex Foam 4
2 Except for production attributed to lead-sheathed hose manufacturing operations.
3 Except for production attributed to chromic acid form-cleaning operations.
4 Except for production that generates zinc as a pollutant in discharge.
Soap and Detergent Manufacturing (40 CFR Part 417)
Soap Manufacture by Batch Kettle
Fatty Acid Manufacture by Fat Splitting
Soap Manufacture by Fatty Acid Neutralization
Glycerine Concentration

Glycerine Distillation
Manufacture of Soap Flakes and Powders
Manufacture of Bar Soaps
Manufacture of Liquid Soaps
Manufacture of Spray Dried Detergents
Manufacture of Liquid Detergents
Manufacture of Dry Blended Detergents
Manufacture of Drum Dried Detergents
Manufacture of Detergent Bars and Cakes
Textile Mills (40 CFR Part 410)
Apparel manufacturing
Cordage and Twine
Padding and Upholstery Filling
Timber Products Processing (40 CFR Part 429)
Barking Process
Finishing Processes
Hardboard -- Dry Process
Source
[51 FR 36372, Oct. 9, 1986][51 FR 36372, Oct. 9, 1986]

Notes
Sec. 54(c)(2) of the Clean Water Act of 1977, (Pub. L. 95-217) sections 204(b)(1)(C), 208(b)(2)(C)(iii), 301(b)(1)(A)(ii), 301(b)(2)(A)(ii), 301(b)(2)(C), 301(h)(5), 301(i)(2), 304(e), 304(g), 307, 308, 309, 402(b), 405 and 501(a) of the Federal Water Pollution Control Act (Pub. L. 92-500) as amended by the Clean Water Act of 1977 and the Water Quality Act of 1987 (Pub. L. 100-4).

APPENDIX E TO PART 403 -- SAMPLING PROCEDURES

A. It is recommended that influent and effluent operational data be obtained through 24-hour flow proportional composite samples. Sampling may be done manually or automatically, and discretely or continuously. If discrete sampling is employed, at least 12 aliquots should be composited. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. All composites should be flow proportional to either the stream flow at the time of collection of the influent aliquot or to the total influent flow since the previous influent aliquot. Volatile pollutant aliquots must be combined in the laboratory immediately before analysis.

B. Effluent sample collection need not be delayed to compensate for hydraulic detention unless the POTW elects to include detention time compensation or unless the Approval Authority requires detention time compensation. The Approval Authority may require that each effluent sample is taken approximately one detention time later than the corresponding influent sample when failure to do so would result in an unrepresentative portrayal of actual POTW operation. The detention period should be based on a 24-hour average daily flow value. The average daily flow should in turn be based on the average of the daily flows during the same month of the previous year.

II. Grab Method

If composite sampling is not an appropriate technique, grab samples should be taken to obtain influent and effluent operational data. A grab sample is an individual sample collected over a period of time not exceeding 15 minutes. The collection of influent grab samples should precede the collection of effluent samples by approximately one detention period except that where the detention period is greater than 24 hours such staggering of the sample collection may not be necessary or appropriate. The detention period should be based on a 24-hour average daily flow value. The average daily flow should in turn be based upon the average of the daily flows during the same month of the previous year. Grab sampling should be employed where the pollutants being evaluated are those, such as cyanide and phenol, which may not be held for an extended period because of biological, chemical or physical interaction which take place after sample collection and affect the results.

Source

[49 FR 31225, Aug. 3, 1984]

Notes

Sec. 54(c)(2) of the Clean Water Act of 1977, (Pub. L. 95-217) sections 204(b)(1)(C), 208(b)(2)(C)(iii), 301(b)(1)(A)(ii), 301(b)(2)(A)(ii), 301(b)(2)(C), 301(h)(5), 301(i)(2), 304(e), 304(g), 307, 308, 309, 402(b), 405 and 501(a) of the Federal Water Pollution Control Act (Pub. L. 92-500) as amended by the Clean Water Act of 1977 and the Water Quality Act of 1987 (Pub. L. 100-4).

APPENDIX G TO PART 403 -- POLLUTANTS ELIGIBLE FOR A REMOVAL CREDIT

I. Regulated Pollutants in Part 503
Eligible for a Removal Credit

Pollutants	Use or disposal practice		
	LA	SD	I
Arsenic	X	X	X
Beryllium			X
Cadmium	X		X
Chromium		X	X
Copper	X		
Lead	X		X
Mercury	X		X
Molybdenum	X		
Nickel	X	X	X
Selenium	X		
Zinc	X		
Total hydrocarbons			X fn1

Key:
LA -- land application.
SD -- surface disposal site without a liner and leachate collection system.
I -- firing of sewage sludge in a sewage sludge incinerator.

Notes

fn1 The following organic pollutants are eligible for a removal credit if the requirements for total hydrocarbons in subpart E in 40 CFR Part 503 are met when sewage sludge is fired in a sewage sludge incinerator: Acrylonitrile, Aldrin/Dieldrin(total), Benzene, Benzidine, Benzo(a)pyrene, Bis(2-chloroethyl)ether, Bis(2-ethylhexyl)phthalate, Bromodichloromethane, Bromoethane, Bromoform, Carbon tetrachloride, Chlordane, Chloroform, Chloromethane, DDD,DDE,DDT, Dibromochloromethane, Dibutyl phthalate, 1,2-dichloroethane, 1,1-dichloroethylene, 2,4-dichlorophenol, 1,3-dichloropropene, Diethyl phthalate, 2,4-dinitrophenol, 1,2-diphenylhydrazine, Di-n-butyl phthalate, Endosulfan, Endrin, Ethylbenzene, Heptachlor, Heptachlor epoxide, Hexachlorobutadiene, Alpha-hexachlorocyclohexane, Beta-hexachlorocyclohexane, Hexachlorocyclopentadiene, Hexachloroethane, Hydrogen cyanide, Isophorone, Lindane, Methylene chloride, Nitrobenzene, N-Nitrosodimethylamine, N-Nitrosodi-n-propylamine, Pentachlorophenol, Phenol, Polychlorinated biphenyls, 2,3,7,8-tetrachlorodibenzo-p-dioxin, 1,1,2,2,-tetrachloroethane, Tetrachloroethylene, Toluene, Toxaphene, Trichloroethylene, 1,2,4-Trichlorobenzene, 1,1,1-Trichloroethane, 1,1,2-Trichloroethane, and 2,4,6-Trichlorophenol.

II. **ADDITIONAL POLLUTANTS ELIGIBLE FOR A REMOVAL CREDIT**

[Milligrams per kilogram -- dry weight basis]

	Use or disposal practice			
		Surface disposal		
Pollutant	LA	Unlined fn1	Lined fn2	I
Arsenic			fn3 100	
Aldrin/Dieldrin (Total)	2.7			
Benzene	fn3 16	140	3400	
Benzo(a)pyrene	15	fn3 100	fn3 100	
Bis(2-ethylhexyl)phthalate		fn3 100	fn3 100	
Cadmium		fn3 100	fn3 100	
Chlordane	86	fn3 100	fn3 100	
Chromium (total)	fn3 100		fn3 100	
Copper		fn3 46	100	1400
DDD, DDE, DDT (Total)	1.2	2000	2000	
2,4 Dichlorophenoxy-acetic acid		7	7	
Fluoride	730			
Heptachlor	7.4			
Hexachlorobenzene	29			
Hexachlorobutadiene	600			
Iron	fn3 78			
Lead		fn3 100	fn3 100	
Lindane	84	fn3 28	fn3 28	
Malathion		0.63	0.63	
Mercury		fn3 100	fn3 100	
Molybdenum		40	40	
Nickel			fn3 100	
N-Nitrosodimethylamine	2.1	0.088	0.088	
Pentachlorophenol	30			
Phenol		82	82	
Polychlorinated biphenyls	4.6	<50	<50	
Selenium		4.8	4.8	4.8
Toxaphene	0	fn3 26	fn3 26	
Trichloroethylene	fn3 10	9500	fn3 10	
Zinc		4500	4500	4500

fn1 Active sewage sludge unit without a liner and leachate collection system.

fn2 Active sewage sludge unit with a liner and leachate collection system.

fn3 Value expressed in grams per kilogram -- dry weight basis.

Key: LA -- land application.
I -- incineration.
Source
[58 FR 9386, Feb. 19, 1993; 60 FR 54764, 54769, Oct. 25, 1995; 64 FR 42552, 42567, Aug. 4, 1999]
Notes
[EFFECTIVE DATE NOTE: 64 FR 42552, 42567, Aug. 4, 1999, revised section II, effective Sept. 3, 1999.]

BEST MANAGEMENT PRACTICES

Background: The definition of Significant Industrial User (SIU) was added to the General Pretreatment Regulation, *40 CFR § 403* on July 24, 1990 and became effective 30 days later. This definition states that;

(1) Except as provided in paragraph (t)(2) of this section, the term Significant Industrial User means:

(i) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; and

(ii) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

(2) Upon a finding that an industrial user meeting the criteria in paragraph (t)(1)(ii) of this section has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority (as defined in 40 CFR 403.12(a)) may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

As stated in (1) (ii), above, any other industrial user that has a reasonable potential for violating a pretreatment standard or requirement should be designated as an SIU by the Control Authority, either as per the potential to violate pretreatment standards or by a determination of the potential to cause an adverse effect.

With the implementation of more stringent water quality based effluent limits many municipalities are confronted with the need to include small volume/quantity industrial users in the community of regulated users. This is most apparent when the Publicly Owned Treatment Works (POTW) develops Technically Based Local Limits (TBLLs) and determines the background or unregulated contribution exceeds or approaches the Maximum Allowable Headworks Loading (MAHL).

In these situations the POTW has little choice but to expand the universe of regulated users and begin to address small volume/quantity dischargers, usually grouped by pollutants discharged or by activity. The problem arises when the POTW determines that these small volume/quantity dischargers are a substantial contribution of the target pollutant and controls are necessary to meet NPDES permit limitations or to allow the establishment of equitable TBLLs for the larger volume dischargers.

Typically the small volume/quantity dischargers include; photodevelopers, printing and publishing facilities and medical facilities for silver; radiator and maintenance shops for lead, copper, zinc and cadmium; septic waste haulers for a multitude of pollutants; etc.

Most POTWs are concerned about the reasonableness of issuing permits and expecting these small volume/quantity dischargers to purchase and maintain the pretreatment equipment necessary to comply with TBLLs.

To avoid an adverse situation many POTWs are developing and implementing Best Management Practices (BMPs) for these facilities; the rationale being that the control and reduction of the target pollutant at many facilities will have a significant impact on the total contribution through the sheer number of facilities involved. This scenario is similar to that implemented in Palo Alto, California for silver reduction.

ACTION: The region must therefore establish guidelines, where a POTW determines it is necessary to regulate traditionally non-significant users, to allow for the implementation of BMPs and also demonstrate compliance with the General Pretreatment Regulations. To accomplish this goal the following **minimum** procedures are proposed:

* All small volume/quantity users within the specified grouping must either be regulated by the BMP guidelines or be permitted.
* Small volume/quantity users that are permitted are expected to comply with all of the pretreatment regulations pertaining to large volume and categorical SIUs.
* A list of small volume/quantity users being regulated under the BMP guidelines shall be maintained by the Control Authority and the Control Authority shall issue Letters of Authorization to each facility indicating the facilities intent to comply with the BMP guidelines.
* The Control Authority must require at least annual reporting by the small volume/quantity users, demonstrating compliance with the BMP guidelines, such as copies of maintenance records for silver recovery equipment or manifests/receipts for septic waste haulers .
* The BMP guidelines must be incorporated into the Approved Pretreatment Program and established as a pretreatment standard/requirement in an ordinance, thus allowing the intent of the SIU definition to be met (however the BMP regulated users shall not be considered significant industrial users).
* The POTW must conduct inspections to determine independent of the information supplied by the industrial user compliance with the pretreatment standards. These inspections could be a reduced number from the entire universe, such as a percentage of facilities regulated by the guidelines (the facilities inspected need to change year to year to eventually allow for full coverage).

Pretreatment Related Forms

The following are various Pretreatment letters, evaluation and reporting form examples.

PRETREATMENT PROGRAM EVALUATION EXAMPLE

1. Has a change in contributing jurisdictions occurred since the last Annual Report?
   Yes No
   If yes, identify the jurisdictions that have been added or removed: _______________
   ____
   ____

2. Has the Control Authority updated its Industrial Waste Survey (IWS) to identify new Industrial Users (IUs) or changes in wastewater discharges at existing IUs? [(403.8(f)(2)(i)]
   Yes No
   If yes:
   a. Are any of these IUs located in new service areas (describe)? _______________
      ____
      ____
   b. Have any IUs located in contributing jurisdictions where the POTW has no inter-jurisdictional agreements or IU contracts? Yes No
   c. If yes, specify: ____
      ____

3. For any new Categorical Industrial Users:
   a. Baseline Monitoring Report (BMR) Submitted? Yes No
   b. Final (90-day) Compliance Report (FCR) Submitted? Yes No

4. How many IUs are currently identified by the Control Authority in each of the following groups?

   ___________ TOTAL SIUs (as defined by Control Authority)
   ______________Categorical Industrial Users (CIUs)
   ______________Significant Non-categorical IUs
   ______________NDCIUs subject to zero discharge limits
   ___________ Other regulated non-categorical IUs (Describe):
   ___________ NDCIUs that are not subject zero discharge categorical limits

5. Is the Control Authority's definition of "**Significant Industrial User**" the same as EPA's? [403.3(t)(1)(i-ii)] Yes No

   If not, the Control Authority has defined "**Significant Industrial User**" to mean: ____
   ____
   ____
   ____
   ____
   ____

6. How many SIUs are required to be covered by an individual control mechanism? ___
   ____

   How many SIUs are not covered by an existing, unexpired permit or other control mechanism? ____

   Explain: ____
   ____
   ____
   ____

7. Were individual control mechanisms issued/reissued for 90% of the SIUs within 180 days of the expiration date? Yes No

   How many control mechanisms were not issued within 180 days of the expiration date?
   ____

   Explain: ____
   ____
   ____
   ____

8. Does the Control Authority have a control mechanism for regulating IUs whose wastes are trucked to the treatment plant? Yes No N/A

   If yes, does control mechanism designate a discharge point? Yes No

9. Are all applicable categorical standards and local limits applied to IUs whose wastes are trucked into the POTW? Yes No N/A

If not, why: ____
____
____
____
____
____

10. Has the Control Authority evaluated the need for SIUs to develop slug discharge control plans? [403.8(f)(2)(v)] Yes No

If yes, when was the evaluation last conducted and what criteria were used to identify the IUs for slug plans? ____
____
____
____
____
____

How many slug control plans were: Required? ________
Received? ________
Approved? ________

11. Are TTO standards or alternatives (solvent management plans or oil & grease monitoring) being implemented for IUs subject to TTO limitations? Yes No N/A

If not, why? ____
____
____
____
____
____

Are TTO standards being applied to other IUs? Yes No

12. How many times were the following monitored during the past year?

	Influent	Effluent	Sludge	Ambient (Receiving Water)
Metals				
Priority Poll.				
Biomonitoring				
TCLP				
EP Tox				
Other:				

13. How many, and what percentage of SIUs were (a) not sampled at least twice, or (b) not inspected at least once during the reporting period? [403.8(f)(2)(vi)]
    a. Number and % not sampled: ______ (_____%)
    b. Number and % not inspected: ______ (_____%)

14. Does the Control Authority routinely split samples with industrial personnel?
    a. If requested: ρ Yes ρ No ρ N/A
    b. To verify IU self-monitoring results: ρ Yes ρ No ρ N/A

15. Provide the following analytical information regarding pollutant analyses:

	Analytical Method	Name of Laboratory
Metals		
Cyanide		
Organics		
Other:		

16. Does the Control Authority use QA/QC for sampling and analysis? Yes No

If yes, describe: ____
____
____

17. How much time normally elapses between sample collection and obtaining analytical results? ____

18. Is there an established protocol clearly detailing sampling location and procedures?
Yes No

19. Has the Control Authority had any problems performing compliance monitoring?
Scheduled Unscheduled Demand

If yes, explain: ____
____
____
____
____
____
____

20. How frequently does the Control Authority use the closed cup flashpoint test, specified in 40 CFR Part 261.21, to monitor SIUs? [403.5(b)(1)]
______Once per year
______Prior to each sampling
______Other: ____

Did the Control Authority find any problems? Yes No

If yes, explain: ____
____
____
____
____
____

21. Does the Control Authority compare all monitoring data to applicable pretreatment standards and requirements contained in the control mechanism within 15 days of its receipt? [403.8(f)(2)(iv)] Yes No

22. Does the Control Authority use EPA's definition of Significant Noncompliance (SNC)? [403.8(f)(2)(vii)] Yes No

23. Are SIUs required to notify the Control Authority within 24 hours of becoming aware of a violation and to submit additional monitoring within 30 days after the violation is identified [403.12(g)(2)] Yes No N/A

If the Control Authority conducts monitoring in lieu of the user, does the Control Authority resample and obtain results within 30 days of identifying a violation?
Yes No N/A

24. Has the Control Authority developed an Enforcement Response Plan? Yes No

25. For each of the listed enforcement actions, identify the following for the ones the Control Authority has used <u>during the reporting period</u>:

	Total # of Actions	# of Industries Affected
Written notice or letter of violation		
Administrative orders		
Administrative fines		
Show cause hearings		
Compliance orders		
Permit revocation		
Civil action		
Criminal action		
Termination of service		
Other (specify):		

26. Indicate the number and percent of SIUs that were identified as being in SNC (as defined by EPA) with the following during the reporting period:

	# of SNC SIUs	% of SNC SIUs
Applicable pretreatment standards [PSNC]*		
Self-monitoring requirements [MSNC]		
Reporting requirements [PSNC]*		
Pretreatment compliance schedule [SSNC]		
Other:		

27. Did the Control Authority publish all SIUS in SNC in the largest daily newspaper? [403.8(f)(2)(vii)] Yes No

If yes, attach copy, or attach copy of affidavit of publication.

28. Indicate the number of SIUs that are currently in SNC with self-monitoring and were not inspected or sampled: ____

29. Has the Control Authority experienced any of the following?

	Yes	No	Unknown	Explain:
Interference				
Pass through				
Fire or explosions (including flash point violations)				
Corrosive structural damage (including pH<5.0)				
Flow obstructions				
Excessive flow or pollutant concentrations				
Heat problems				
Interference due to oil or grease				
Toxic fumes				
Illicit dumping of hauled waste				

30. How many SIUs are currently on compliance schedules in order to meet new or revised national pretreatment standards or requirements?______________________

Have any CIUs been allowed more than 3 years from the effective date of a categorical standard to achieve compliance? [403.6(b)] es No

31. Indicate the number of SIUs from which penalties have been collected by the Control Authority during the past year:

	Number	Amount ($)
Civil		
Administrative		
Total		

32. Have IUs requested that data be held confidential? Yes No

33. Have any requests been made by the public to review files? Yes No

34. Has public comment been solicited during revisions to the SUO and/or local limits since the last PCI or audit? [403.5(c)(3)] Yes No N/A

35. Are there significant public or community issues impacting the POTW's pretreatment program? Yes No

If yes, explain:____

____

____

____

____

.____

____

____

36. Are all records maintained for at least 3 years? Yes No N/A

37. Have any problems in program implementation been observed which appear to be related to inadequate funding, resources or staff? Yes No

If yes, explain:____

38. Does the Control Authority have the technical documents necessary for implementing its pretreatment program? Yes No

39. Does the Control Authority have access to adequate:

	Yes	No	Explain:
Sampling equipment			
Safety equipment			
Vehicles			
Analytical equipment			

PERMIT COVER SHEET EXAMPLE

Control Authority Name: ____

Treatment Plant Name(s): Permit Number(s):

____ ____________

____ ____________

____ ____________

____ ____________

____ ____________

Pretreatment Contact: ________________________

Title: ________________________

Address: ________________________

____

____

City, State, Zip Code: ________________________

Telephone: ________________________

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

________________________________ ____________

POTW Authorized Signatory Date

____

Title

1. Approval Date of Original Pretreatment Program:

2. Program Materials Under Development (Date Planned for Submission):

3. Program Materials Submitted for Review/Approval (Date Submitted):

4. Program Materials Approved (Date Approved/Date Incorporated into NPDES Permit):

5. Additional Noteworthy Pretreatment Activities/Accomplishments:

LIST OF REGULATED USERS

Name of User	SIU (Y/N)	CIU (Y/N)	40 CFR Part No.	NDCIU (Y/N)	SIC Code	Permit Issued (Y/N)

INDUSTRIAL SURVEY UPDATE

Name of Industry	Survey Returned (Y/N)	Permit Application Required (Y/N)	Permit Application Returned (Y/N)	Permit Issued (Y/N)	Comments

COMPLIANCE/OVERSIGHT SUMMARY
(SIUs ONLY)

Name of SIU	Permit Expiration Date	Number of Documented Inspections	POTW Sampling (All Regulated Pollutants)	SIU Self-Monitoring (All Regulated Pollutants)	SNC for Quarter[1]			
					1	2	3	4

B – SNC with Self-Monitoring Requirements
C – SNC with Reporting Requirements
D – SNC with Compliance Schedule

NONCOMPLIANCE/ENFORCEMENT SUMMARY
(SIUs ONLY)

Name of SIU	Nature of Violation	Date of Violation	POTW Enforcement Response	Date of POTW Response	Date of Return to Compliance	Comments

Examples of Regulatory and Compliance Letters

December 11, 2019

Mr. D. Robert Kelly
Ajax Well Repair, Inc.
8111 East Montebello Drive
Phoenix, Az. 85777

Dear Mr. Kelly:

RE: DISCHARGE OF WELL MONITORING WATER AT ACME'S PEORIA AVENUE FACILITY

I am in receipt of your letter dated December 4, 2019, in which you requested to discharge approximately 3000 gallons of groundwater generated during the sampling operations of MW-1a thru MW-9 located at, and in the immediate vicinity of, the Acme Peoria Avenue facility, 2250 West Peoria Avenue. The groundwater withdrawn from monitoring wells located at this site is part of a Remedial Investigation / Feasibility Study required by the Arizona Department of Environmental Quality.

Approval is hereby granted for the discharge of approximately 3000 gallons of well purge water. This discharge is anticipated to occur sometime during the period of December 11, through December 16, 2007, to City of Sunflower manholes 124 and 125 in Quarter Section 30-24, and manholes 302 and 403 in Quarter Section 29-23. This discharge shall not exceed a flow rate of 50 gallons per minute, in order to avoid hydraulic overloading of the sewer mains in the area.

This approval is based on a thorough review of the historic analytical data submitted in your letter of September 27, 2019 and 2nd Quarter water quality results submitted with the December 4, 2001 letter. Our review indicates, the Toxic Organics were analyzed using EPA methods 601. All VOC concentrations were found to be less than the Sunflower City Code Instantaneous Effluent Limitations.

It is the opinion of the City of Sunflower Water Quality Division that the wastewater meets all requirements under Chapter 28. The wastewater is also determined not to be in sufficient quantity to injure or interfere with any sewage treatment process, cause corrosive structural damage, constitute a hazard to humans, or create any hazard to the sewer system, or in the receiving waters of the sewage treatment plant.

Please submit your final status report within ten (10) days of the date of discharge. This report shall include the date(s) of discharge, time of day this discharge occurred, and the total gallonage.

Please review the permit thoroughly. Should you have any questions, please contact me at 534-1362. Our office hours are 8:00 a.m. to 5:00 p.m., Monday through Friday.

Sincerely,

MANHOLE ENTRY PERMIT Example

The City of Sunflower, acting through the Water and Wastewater Department, hereby issues a manhole permit to:

Ajax Well Repair, Inc
8111 East Montebello Drive
Suite 116
Tempe, AZ. 85281

hereinafter called Permittee, for the purpose of entering City of Sunflower manhole nos. 124 and 125 in Quarter Section 30-24 and manhole nos. 302 and 403 in Quarter Section 29-23 to dispose groundwater brought to the surface during monitor well pumping test operations at and in the immediate vicinity of:

Acme's Peoria Avenue Facility
7574 West Culver Avenue
Sunflower, Arizona

Prior results from laboratory chemical analyses, from December, 1999 to June, 2001, indicate that concentrations of volatile organic compounds are less than 1000 micrograms per liter. Monitor well water will be sampled and analyzed for volatile organic compounds using EPA methods 601/602 and method 624 for purgeable volatiles. Discharge to the sewer must not exceed 50 gallons per minute , in order to avoid hydraulic overloading of the sewer mains in the area.

The manhole entry permit is issued subject to the following conditions:

1. That the only activities authorized by the permit are for the purposes of removal of the contained wastewater, and that the Permittee conduct no other activity while entering upon the public property authorized by this permit.

2. That the Permittee's activities be conducted only within the time period of December 11, through December 16, 2007, unless authorized in writing by the Water and Wastewater Director for an extension of time, or unless revoked earlier, and that the Permittee notify the Water and Wastewater Department in advance of each separate entry.

3. Permittee shall submit analytical results as established in Section 3 of this permit within 10 days of completing discharge of development and purge waters.

4. Permittee shall incur costs of $1.0255 per one hundred cubic feet (or current rate as established by water accounting) of ground water discharged.

5. That the Permittee, when finished with the removal and discharge activities, replace to the satisfaction of the Water and Wastewater Director, any manhole covers or other disturbances to the City of Sunflower sewer lines that he caused during the course of his activities.

6. That the Permittee agrees to save and hold harmless, the City, any of its departments, agencies, officers or employees from all costs and damages occurred by any of the above from any damage to any person or property whatsoever which is caused by the activity, condition or event arising out of the negligent performance or nonperformance of any of the provisions of this

permit by the Permittee any of the Permittee's agents, or any of the Permittee's independent contractors. The above costs incurred by the City, any of its departments, agencies, officers or employees shall include in the event of any action, court cost, expensive litigation and reasonable attorney fees. When any of the above costs and/or damages occur as aforesaid, the Permittee assumes the burden of proof that the negligent activity, condition or event did not cause such cost damage or other expense the City may incur.

The Permittee agrees to the condition set forth in this permit, and understands that all activities done under the conditions of this permit should conform to the laws of the City of Sunflower and the State of Arizona.

Dated this _______ day of _________________, 2007.

____
Permittee

Dated this _______ day of _________________, 2007.

CITY OF SUNFLOWER,
a municipal corporation

By: ________________________________
Chris Binder
Chief Water Quality Inspector
Water Services Department

MANHOLE NO.	QUARTER SECTION	DESCRIPTION OF LOCATION
MH 124	30-24	5 feet west of center line in 21st Avenue approximately 150 feet north of center line of Fred Street. For monitor well MW-6.
MH 125	30-24	1 foot of center line in 23rd Avenue and approximately 140 feet south of center line in Frank Street. For monitor well MW-5.

September 1, 2007

Mr. Dewey Hopkins, President
Acme Technical Casting, Inc.
8111 East Montebello Street
Sunflower, Arizona 85040

Certified Mail
Return Receipt Requested

Re: Confirmation of Wastewater Discharge Permit Reclassification From Class A to Class B

Dear Mr. Myers:

I am writing this letter to acknowledge your meeting on August 29, 2001 with Chris Binder, Chief Water Quality Inspector, and to confirm the City of Sunflower' (City) decision to reclassify the permit status of Acme Technical Casting, Inc. (Acme) from "***Class A***" to "***Class B***." While the reasons forming the basis for this decision were briefly discussed at the meeting, I believe it necessary to recite them here so that Acme thoroughly understands why the City made this decision.

BACKGROUND INFORMATION

The information contained in this portion of my letter is based upon documentation contained in our file, observations made by City Water Quality Inspectors during on-site inspections and various meetings with Acme representatives.

Acme manufactures investment castings for commercial and aerospace applications using ferrous and non-ferrous metals. Pretreatment consists of a closed loop recirculating filtration system. There is no categorical discharge to the sanitary sewer. Any sludge resulting from the manufacturing process is disposed of accordingly.

There are no floor drains in the production area. The floor is bermed and sloped to a sump in the pretreatment area. All categorical process discharge lines have been cut and plugged. This has been verified by on-site inspections performed by City Water Quality Inspectors. The wastewater discharge of approximately 4000 gallons per day (gpd) consists of non-federally regulated penetrant and X-ray rinses, in addition to sanitary wastes.

Even though the manufacturing operation is regulated by the 40 CFR 464.15(f) and 40 CFR 464.36(e)(2), metal molding and casting category, there is no discharge of this process wastewater to the sanitary sewer. Therefore, Acme does not conduct any activities that are regulated by the federal categorical standards contained in 40 CFR Chapter I, Subchapter N (parts 405-471). However, Acme is required to comply with 40 CFR 403 and Chapter 28 of the Sunflower City Code. Acme has been permitted as a Significant Industrial User (**SIU**) since June 24, 1991.

Acme has had two effluent violations in the past four years. Both were for exceeding the silver limitation, and the last violation occurred on September 5, 2007. Acme received the Mayor's Award recognizing full compliance with pretreatment requirements for the year 2006.

The total daily poundage from the biological oxygen demand (BOD) and suspended solids (SS) concentrations of the process wastewater is approximately 9.5 pounds. This is substantially less than the equivalent strength of 25,000 gpd of domestic waste when measured by BOD and SS (approximately 75 pounds).

PERMITTING STRUCTURE

As you know, the wastewater discharge permitting requirements are contained in Chapter 28 of the Sunflower City Code. When Acme was first issued a permit, the City only issued permits to SIU's. Due to its federal categorical discharge flows, Acme was designated in 1997 as a SIU. The City has since revised its permitting structure to allow for the issuance of non-SIU permits to other industrial users. The SIU permits are designated as Class A, with the non-SIU permits falling into the Class B category.

DECLASSIFICATION ANALYSIS

When a SIU permit is up for renewal, or when the City is made aware of changes made by the SIU that could change the status of the existing Class A permit, the City reviews all relevant information to determine (1) whether the SIU should continue to be classified as a SIU and therefore be issued a Class A permit; or (2) whether the industrial user qualifies for a Class B Permit. A Class B permit generally contains less restrictive requirements than a Class A permit.

Section 10-45.1 of the City Code allows industrial users to be issued a Class B permit if they: (1) are a zero process discharge user; (2) discharge the equivalent strength of 25,000 gallons per day of domestic waste as measured by BOD (Biological Oxygen Demand) and SS (Suspended Solids); (3) discharge polluted groundwater; or (4) discharge any of the substances identified in Sections 28-9 and 28-45(b) of the City Code.

Eligibility for a B permit is for those users discharging less than 25,000 gpd of process wastewater and there are no discharges of any federal categorical process wastewater. It is evident from the Background Section of this letter that Acme met this threshold requirement.

Our next step was to gather and evaluate additional information to determine whether Acme discharges causes or has the reasonable potential to cause harm or damage to the City's wastewater treatment plants, worker safety, public safety or to the environment. Without going into detail over everything that was considered, we did ask ourselves the following questions:

1. What is the average annual water consumption at the facility?

2. What are the process wastewater biological demand and suspended solids concentrations?

3. What types of activities are conducted on the site?

4. Is there a reasonable potential for adversely affecting the City's wastewater treatment plant operation or for violating any pretreatment standard or requirement?

5. Does the discharge pose a health and safety concern to Water Services personnel?

6. What is the compliance history of the facility?

7. What is the existence and effectiveness of pretreatment used by the facility?

8. Has there been any receipt of any environmental awards (e.g., Mayor's Recognition of Achievement for Full Compliance With Pretreatment Requirements)?

9. Does the facility have a written policy or philosophy pertaining to environmental matters and is it being followed?

10. Has the facility always exhibited good faith efforts in complying with Chapter 28 requirements?

11. Is this a special discharge under Section 28-45.1 of the Sunflower City Code?

Based upon all of the foregoing considerations, the City has reclassified the permit status of Acme from a Class A permit to a Class B permit.

WHAT RECLASSIFICATION MEANS TO YOU

1) Effective July 1, 2007, Wastewater Discharge Permit No. 9405-2910 is rescinded. Acme is no longer designated as a Significant Industrial User under Section 28-45 of the Sunflower City Code.

2) On or before September 15, 2007, Acme will be issued a Class B Wastewater Discharge Permit.

3) Effective July 1, 2007, Acme will not be subject to the annual permitting fee contained in Section 28-39(h) of the City Code. This information will be provided to the City's Customer Service Division of the Water Services

Department and any adjustments will be made on a future billing statement.

4) Acme will no longer be eligible for the Mayor's Recognition of Achievement Award for Full Compliance with Pretreatment Requirements since the award is only given to Class A permittees. However, the City is considering whether to have some type of award for Class B Permit holders.

5) Please be aware that even though Acme is not a SIU based upon the facts as they exist today, this designation can change if the basis for our decision to issue a Class B Permit is no longer valid. For example, changes in your zero discharge of categorical process wastewater status so that Acme now has categorical process wastewater flow to the sanitary sewer will require a reclassification and return to SIU status. The City will review your permit classification status on an annual basis, or more frequently if warranted under the circumstances.

CONCLUSION

Acme will receive a Class B wastewater discharge permit under our new permitting structure. We are confident that Acme will continue to be responsible and use sound and prudent judgment in the handling of its wastewater discharges.

Chris Binder, Senior Water Quality Inspector, is the inspector that has been assigned to your facility. Please feel free to contact him at 474-8888 should you have any questions pertaining to your new permit.

Sincerely,

Bill Fields
Water Quality Supervisor

HIGH STRENGTH DISCHARGE PERMIT EXAMPLE

Facility Name: ACME Services Group of Sunflower

Facility Address: 8111 West Montebello Street
Sunflower, Arizona 85297

Mail Address: 8111 West Montebello Street
Sunflower, Arizona 85297

PERMIT EFFECTIVE DATE: January 1, 2007

PERMIT EXPIRATION DATE: December 31, 2008

In accordance with the Permit Application filed by **ACME Services Group (ACME)** on **01/02/02** with the City of Sunflower Pollution Control Division, this High Strength Discharge Permit (Permit) is granted to the above facility (i.e., Permittee) to discharge process wastewater to the City of Sunflower (City) Sanitary Sewer Collection System in accordance with the terms and conditions of this Permit.

The Permittee shall comply with Chapter 10 of the Sunflower City Code, all federal and state laws and regulations pertaining to the Permittee's discharge and all provisions of this Permit.

This Permit replaces all previously issued Permits. If you believe that the City should reconsider the conditions and limitations of this Permit you have the right to file a Petition for Review within twenty (20) days of your receipt of this Permit. A copy of Section 10-46.1 governing the Permit Appeals Process is attached.

Date of Issue: December 30, 2006
Modified on **January 13, 2007**

Chris Binder
Water Quality Supervisor

I. SPECIFIC REQUIREMENTS

A. Discharge Limitations

1. The Permittee is authorized to discharge previously collected human wastes from portable toilets through a private manhole on their property, and truck/toilet washing/maintenance operation discharges to the compliance sampling point described as a **three inch Parshall flume vault located at the northwest corner of the property approximately 20 feet west of the driveway.**
2. The compliance sampling point is illustrated in Attachment A of this Permit.

2. Flow volume through the compliance sampling point averages 4,500 gallons per day but in no event shall exceed 7,000 gallons during any single day.

3. During the term of this Permit, all discharges shall comply with the general user requirements contained in Section 10-8 of the Sunflower City Code.

B. Sampling Requirements and Procedures

1. Permittee shall sample once per month (starting the month of January 2001) for arsenic, copper, lead, and mercury by the taking of a composite sample, and pH, total petroleum hydrocarbons (TPH) and total sulfides, by the taking of grab samples at the compliance sampling point. The pH shall be within the instantaneous limits of 5.0 - 10.5 s.u. (standard units). The TPH shall be 100 mg/l or less. There is no numerical limit at this time associated with the metals, or sulfide samples.

2. All samples shall be taken at the compliance sampling point specified in this Permit and, unless otherwise specified, before the wastewater joins or is diluted by any other wastestream, body of water or substance. All equipment used for sampling and analysis must be routinely calibrated and inspected and maintained to ensure accuracy. The sampling point shall not be changed without written approval of the City.

3. Sampling and analysis of these samples shall be performed in accordance with the techniques prescribed in 40 CFR Part 136, as may be amended. For TPH analysis, use EPA method 418.1.

4. If required, appropriate flow measurement devices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. Devices shall not be installed without prior written approval from the City.

C. Periodic Monitoring Report Required

1. All reporting (including written notifications, oral notifications and discharge sampling reports) required by this Permit shall, unless otherwise specified, be addressed to:

City of Sunflower
Water Services Department
Pollution Control Division
1534 West Montebello
Sunflower, Arizona 85297

2. Each submitted discharge sampling report, written notification, or any other report required by this Permit, must be signed (see Part II. N of this Permit for signatory requirements).

3. Sampling results shall be summarized and reported on a High Strength Discharge Monitoring Report Form provided by the City. This report is due on the last day of each month and is to include all results of monitoring performed during that calendar month as well as information required for the prior calendar month that has not been previously submitted. The report must be received at the above address no later than the due date so as not to be considered late. The first report is due no later than January 31, 2001. Each report should indicate the results of all sampling as set forth in Part I (B) and (G) of this Permit. Reports must also be submitted during months in which no wastewater discharge occurred and include a zero discharge certification statement on a form provided by the City.

4. If Permittee samples more frequently at the compliance sampling point than required by this Permit, using test procedures approved under 40 CFR Part 136 or as specified in this Permit, the results of such sampling shall be reported in the monthly report.

D. pH Log Book

Permittee is required to maintain a log book of pH measurements showing date and time of measurement, name of the person performing the measurement, and pH meter calibration data for all samples collected at the compliance sampling location.

E. Maintenance of Compliance Monitoring Point

1. Permittee shall maintain the compliance sampling point, illustrated in Attachment A, in continuously efficient operations at all times.

2. Permittee is required to keep written documentation of maintenance which includes at least the following:

   a. Date of service;
   b. Who performed the service (contractor name or Permittee employee name and title);
   c. Nature of service (repaired - nature of repair, inspection, cleaned, etc.).

F. Maintenance of Pretreatment Interceptors

1. Permittee is required to maintain the two stage seven hundred fifty gallon sand/oil interceptor located approximately 6 feet west of the toilet cleaning pad and the three stage, two thousand gallon interceptor located 25 feet west of the northwest corner of the maintenance shop building which receives wastewater from the truck/toilet washing/maintenance operation in continuously efficient operations at all times.

2. Permittee is required to maintain written documentation of both of the interceptor's maintenance which includes at least the following:

   a. Date of service;

   b. Who performed the service (contractor name or Permittee name and title).

   c. Nature of service (pumped, repaired -- nature of repair, inspection, etc.)

G. Access Restrictions/Security /Special Sampling Requirements

1. Beginning February 1, 2001, permittee will perform screening tests on samples collected from individual trucks prior to discharge to the compliance sampling point, on a random basis picked by a computer system, for the following parameters and according to the following schedule:

   a. The following will be tested on every truck:

PARAMETER	ACCEPTABLE CRITERIA
PH	5.0 - 10.5 s.u.
ORP	-500 to +500 mv
Temperature	150° F or less

   b. From February 1, 2001 through July 31, 2001, a minimum of one truck per day will be tested for the following:

PARAMETER	ACCEPTABLE CRITERIA
Colorimetric analysis:	
Cyanide (filtered sample)	2.0 mg/L
Chromate (filtered sample)	0.5 mg/L
Copper (filtered sample)	10.0 mg/L
Test Paper:	
Lead	5.0 mg/L
Organic Solvent/Petroleum Hydrocarbons	10 mg/L gasoline
Oxidizer	3.0 mg/L as H_2O_2
Fluoride	20 mg/L
Iodine, Bromine, Chlorine	1 mg/L

   c. After the expiration of the time period in part b above, for the remaining term of this permit, a minimum of three trucks per week will be tested for those parameters identified in part b.

   d. In addition, a minimum of one sample every month will be collected from a truck and analyzed by a licensed laboratory for arsenic, copper, lead and mercury.

e. If any of the parameters identified above exceed the Acceptable Criteria, then the load will be temporarily stored in the 1,000 gallon above ground holding tank and handled as set forth in subparagraph 6 of this paragraph G.

f. The City anticipates that the sampling frequencies and Acceptable Criteria contained in this paragraph G may need to be changed based upon the sampling generated from February 1, 2001 through July 31, 2001, and in such event this Permit will be amended accordingly. However, until this Permit is amended, the sampling frequencies and Acceptable Criteria contained in this paragraph G will remain in effect.

Permittee will include all results of individual truck testing with monthly reports as required in Part I. C . of this Permit.

2. Prior to February 1, 2001, Permittee will purchase, install and maintain a locked manhole cover over the truck discharge point, with access being limited to a select number of Permittee's employees having keys.

3. Prior to March 1, 2001, Permittee will issue a form letter to all existing customers (and thereafter on an annual basis) and to each new customer at time of initial service, placing that customer on notice that any discharge of foreign material into portable toilets is prohibited.

4. Prior to March 1, 2001, Permittee will conspicuously label all portable toilets with a warning that any disposal of foreign substance into portable toilets is unlawful and may lead to fines and/or prosecution.

5. Permittee will provide all current service drivers and employees (prior to March 1, 2001) and future portable service drivers (within 15 days of hiring) with training to detect the presence of foreign material in the portable toilets. In addition to acknowledging the training provided by Permittee, all drivers will sign a separate Acknowledgement of Training Form stating their understanding of the following procedures:

a. All drivers will perform visual and olfactory inspections of each toilet for foreign material prior to and while pumping portable toilets;

b. In the event foreign material is detected during these inspections, the driver will notify Permittee's Facility Operations via mobile radio or telephone immediately;

c. The driver will tag the unit with a Bypass Ticket notifying the customer of the nature of the problem. The driver shall also attempt to contact a responsible party on the job site and advise that party to contact Permittee's office;

d. The driver will turn in the route card or route sheet with a copy of the Bypass Ticket to operations at the end of the route;

e. ACME Operations will then remove that unit from the route and forward the Bypass Ticket to the sales department for customer contact and resolution;

f. The ACME Sales Department will notify the customer of their responsibility to legally dispose of the foreign material. The customer will be advised to contact the ACME Sales Department when the foreign material has been removed;

g. Upon notification of removal by the customer, the sales department will notify ACME Operations. ACME Operations will conduct a field inspection of the unit and reinsert the unit into the route for service;

h. Any unit containing foreign material will not be removed from a particular job site until the customer has appropriately addressed the removal of the foreign material.

All signed Acknowledgement Training Forms will be placed in each employee's personnel file and be made available to City personnel during inspections. This employee training will be incorporated into Permittee's general monthly employee meetings, a record of which shall be maintained at the facility.

6. Prior to March 1, 2001, the Permittee will install and maintain a one thousand (1000) gallon above ground tank at the facility. If a questionable wastestream is determined while testing, that particular waste load will be temporarily stored in this tank. The contents will be retested by a licensed laboratory for a complete list of parameters as determined by the City. Should the retest confirm the wastestream is not suitable for discharge to the compliance point, the contents will be disposed of in a manner as required by state and federal law. At no time will Permittee discharge a questionable load to the sanitary sewer.

II. HIGH STRENGTH DISCHARGE PERMIT STANDARD CONDITIONS

A. Permittee Shall Provide Notice of Changes

Any changes, permanent or temporary, to the premises or operations that significantly change the quality or volume of the wastewater discharge or other changes that have occurred which differ from what was stated in the Permit application shall be reported by the Permittee 90 days prior to making the changes.

B. Permittee Shall Provide Notification of Noncompliance

Permittee shall notify the City within 24 hours of becoming aware of a discharge which is known or suspected to be in violation with any limitation or provision of this Permit, including an accidental spill of substances prohibited by Section 10 of the Sunflower City Code.

C. Permittee Shall Provide Information

The Permittee shall furnish to the Pollution Control Division, by the date requested, any information to determine whether cause exists for modifying or revoking this Permit, or to determine compliance with this Permit. The Permittee shall also furnish to the Pollution Control Division, upon request, copies of records required by this Permit to be kept by the Permittee.

D. Inspection and Entry of Facility

The Permittee shall provide free access to all areas of the facility to an authorized representative of the Pollution Control Division, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter at any time during normal hours of operation upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit and any production, or storage area where discharge regulated under this Permit, could originate or may be subject to regulation; and

4. Sample or monitor, for the purposes of assuring Permit compliance, any substances or parameters at any location.

E. Permittee Shall Retain Records

1. The Permittee shall retain on site, copies of all reports required by this Permit, including all emergency response procedures and incident documentation and records of all data used to complete the application for this Permit, for a period of at least three years from the date of the document preparation.

2. All records which pertain to matters that are the subject of special orders or any other enforcement or litigation activities brought by the Pollution Control Division shall be retained and preserved by the Permittee until all enforcement activities have concluded and all periods of limitation with respect to any and all appeals have expired.

3. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, for a period of at least three years from the date of the sample or measurement.

4. Sampling records shall contain the following:

   a. The date, exact place, time, and methods of sampling or measurements, and sample preservation techniques or procedures;

   b. Who performed the sampling or measurements;

   c. The date(s) analyses were performed;

   d. Who performed the analyses;

   e. The analytical techniques or methods used; and

   f. The results of such analyses.

5. Additional Sampling by the Permittee

   If the Permittee samples more frequently than required by this Permit, using approved test procedures or as specified in this Permit, the results of this monitoring shall be maintained as a part of Permittee's records for a period of at least three years from the date of the sampling.

F. Emergency Response Procedures and Incident Documentation Reports

1. Permittee shall have emergency response procedures which, at a minimum, identify how to document the incident(s) or other event(s) that does or may result in a discharge in excess of the Permit limitations to the sanitary sewer and identifies the agency(s) and

official(s) to notify in case of a spill or need to discharge this process wastewater to the sanitary sewer.

2. Emergency incident documentation requirements shall at a minimum include:

   a. date, time of emergency
   b. description of emergency including discharge constituents and quantity
   c. documentation of agency and agency official notification
   d. cause of emergency
   e. corrective actions taken or to be taken to correct the incident
   f. corrective action plan to prevent a future incident
   g. report on compliance with corrective action schedule(s)

3. Any emergency incident causing a wastewater discharge to the sanitary sewer does not relieve the Permittee from the requirements set forth in 40 CFR Part 403, Chapter 10 of the City Code and this Permit.

G. Duty to Reapply; Automatic Extension of Permit

If Permittee wishes to continue an activity regulated by this Permit after the expiration date of this Permit, Permittee must apply for and obtain a new Permit. The application must be submitted at least 60 calendar days before the expiration date of this Permit. Subject to the City's right to amend, or, revoke this Permit, or to deny a new Permit, this Permit shall automatically continue to remain in full force and effect after the expiration date if Permittee has timely filed the Permit application and a new Permit is not issued prior to the Permit expiration date.

H. Permit Modification

This Permit may be modified by the City:

1. To incorporate any new or revised federal, state, or local pretreatment standards or requirements;

2. To make changes due to material or substantial alterations or additions to the Permittee's operation which were not covered in the issued Permit;

3. To correct any errors;

4. To make changes that are deemed reasonably necessary to prevent pass through or interference, protect the quality of the water body receiving the treatment plant's effluent, protect worker health and safety, facilitate sludge management and disposal, protect against damage to the POTW and to ensure user compliance with Chapter 10 of the Sunflower City Code or state and federal laws, rules and regulation.

I. <u>Permit Revocation</u>

This Permit may be revoked for good cause, including but not limited to:

1. failure to notify the City of significant changes to the wastewater prior to the changed discharge;
2. failure to provide prior notification to the City of changed conditions pursuant to Section 10-44(f) of the Sunflower City Code;
3. misrepresentation or failure to fully disclose all relevant facts in the wastewater discharge Permit application;
4. falsifying self-monitoring reports;
5. tampering with monitoring equipment;
6. refusing to allow the City timely access to the facility premises and records;
7. failure to meet effluent limitations;
8. failure to pay fines and penalties;
9. failure to pay sewer charges;
10. failure to meet compliance schedules;
11. failure to complete a wastewater survey or the Permit application;
12. failure to provide advance notice of the transfer of business ownership of a Permitted facility; or
13. violation of any pretreatment standard or requirement, or any terms of the Permit or requirement of Chapter 10 of the Sunflower City Code; or
14. when the City has determined that a Permit reclassification is required.

J. <u>Permit Not a Property Right</u>

The issuance of this Permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

K. <u>Non-Transferability of Permit</u>

This Permit is not transferable to any person. In the event of sale or change of ownership the Permittee shall provide written notice to the Pollution Control Division thirty (30) days prior to the effective date of sale or change of ownership.

L. <u>Severability</u>

The provisions of this Permit are severable. If any provision of this Permit, or the application of any provision of this Permit to any circumstances is held invalid, the application of such provision to other circumstances, and the remainder of this Permit, shall not be affected thereby.

M. Civil and Criminal Penalties

Any violation of this Permit can result in both civil and criminal penalties, that are in addition to all remedies available to the City set forth in Chapter 10 of the Sunflower City Code. Civil Penalties can be $25,000 per day per violation. Criminal misdemeanors can result in fines of $2500.00 per day per violation in addition to imprisonment of 6 months.

N. Signatory Requirements

Permit applications, correspondence and all reports shall be signed by the appropriate signatory:

1. For a corporation: by a corporate officer or other persons performing a similar policy or decision-making function for the corporation;

2. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;

3. All applications, correspondence, reports, and self-monitoring reports may be signed by a duly authorized representative of the person described above. A person is a duly authorized representative only if:

   a. the authorization is made in writing by a person described above; and

   b. the authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position).

4. Any person signing a document required under this Permit shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

GAS METER CALIBRATION LOG

Meter # ______________________________

DATE	COMB (58) (52-64)	0_2 (15%) (13-17%)	CO (300) (290-310)	H_2S (10ppm) (9-12 ppm)	COMMENTS (SENSORS & BATTERIES)	INIT

Glossary

2,4-D: A chlorinated phenoxy compound, functions as a systemic herbicide and is used to control many types of broadleaf weeds. There are many forms or derivatives (esters, amines, salts) of 2,4-D and these vary in solubility and volatility. Unless otherwise specified, this document will refer to the acid form of 2,4-D. This compound is used in cultivated agriculture and in pasture and rangeland applications, forest management, home and garden situations and for the control of aquatic vegetation. 2,4-D was a major component (about 50%) of the product Agent Orange used extensively throughout Vietnam. However most of the problems associated with the use of Agent Orange were associated with a contaminant (dioxin) in the 2,4,5-T component of the defoliant. The association of 2,4-D with Agent Orange has prompted a vast amount of study on the herbicide.
ABIOGENESIS: The concept of spontaneous generation (that life can come from non-life). This idea was refuted by Pasteur.
ABIOTIC: The non-living components of an organism's environment. The term abiotic is also used to denote a process which is not facilitated by living organisms.
ABORAL: Pertaining to the region of the body opposite that of the mouth. Normally used to describe radially symmetrical animals.
ABSCISIC ACID (ABA): A plant hormone that generally acts to inhibit growth, promote dormancy, and help the plant withstand stressful conditions.
ABSENCE OF OXYGEN: The complete absence of oxygen in water described as Anaerobic.
ABSORPTION SPECTRUM: The range of a material's ability to absorb various wavelengths of light. The absorption spectrum is studied to evaluate the function of photosynthetic pigments.
ACCURACY: How closely an instrument measures the true or actual value.
ACID ADDITION: Slowly add the acid to water while stirring. An operator should not mix acid and water or acid to a strong base.
ACID AND BASE ARE MIXED: When an acid and a base are mixed, an explosive reaction occurs and decomposition products are created under certain conditions.
ACID RAIN: Rain that is excessively acidic due to the presence of acid: causing pollutants in the atmosphere. Pollutants include nitrogen and sulfur oxides due to burning of coal and oil.
ACID: n **acid** is a molecule or ion capable of donating a hydron (proton or hydrogen ion H^+), or, alternatively, capable of forming a covalent bond with an electron pair (a Lewis acid). The first category of acids is the proton donors or Brønsted acids. In the special case of aqueous solutions, proton donors form the hydronium ion H_3O^+ and are known as Arrhenius acids. Brønsted and Lowry generalized the Arrhenius theory to include non-aqueous solvents. A Brønsted or Arrhenius acid usually contains a hydrogen atom bonded to a chemical structure that is still energetically favorable after loss of H^+.
ACIDOSIS: A condition whereby the hydrogen ion concentration of the tissues is increased (and pH decreased). Respiratory acidosis is due to the retention of CO_2; metabolic acidosis by retention of acids due either to kidney failure or diarrhea.
ACTIVATED SLUDGE PROCESS: A biological wastewater treatment process in which a mixture of wastewater and biologically enriched sludge is mixed and aerated to facilitate aerobic decomposition by microbes.
ACTIVATED SLUDGE: The biologically active solids in an activated sludge process wastewater treatment plant.
ACTIVATING ENZYME: An enzyme that couples a low-energy compound with ATP to yield a high-energy derivative.
ACTIVATION ENERGY: In a chemical reaction, the initial investment required to energize the bonds of the reactants to an unstable transition state that precedes the formation of the products.
ACTIVE SITE: That specific portion of an enzyme that attaches to the substrate by means of weak chemical bonds.
ACTIVE TRANSPORT: The movement of a substance across a biological membrane against its concentration or electrochemical gradient with the help of energy input and specific transport proteins.
ADAPTATION: Any genetically controlled characteristic that increases an organism's fitness, usually by helping the organism to survive and reproduce in the environment it inhabits.
ADAPTIVE RADIATION: This refers to the rapid evolution of one or a few forms into many different species that occupy different habitats within a new geographical area.
ADHESION: In chemistry, the phenomenon whereby one substance tends to cling to another substance. Water molecules exhibit adhesion, especially toward charged surfaces.
ADP (Adenosine diphosphate): A doubly phosphorylated organic compound that can be further phosphorylated to form ATP.
ADRENAL GLAND: An endocrine gland located adjacent to the kidney in mammals. It is composed of an outer cortex, and a central medulla, each involved in different hormone: mediated phenomena.

ADRENALIN: A hormone produced by the pituitary that stimulates the adrenal cortex.
ADSORB: Hold on a surface.
ADSORPTION: *Not to be confused with absorption.* Adsorption is a process that occurs when a gas or liquid solute accumulates on the surface of a solid or a liquid (adsorbent), forming a film of molecules or atoms (the adsorbate). It is different from absorption, in which a substance diffuses into a liquid or solid to form a solution. The term sorption encompasses both processes, while desorption is the reverse process. Adsorption is present in many natural physical, biological, and chemical systems, and is widely used in industrial applications such as activated charcoal, synthetic resins, and water purification. Adsorption, ion exchange, and chromatography are sorption processes in which certain adsorbates are selectively transferred from the fluid phase to the surface of insoluble, rigid particles suspended in a vessel or packed in a column. Similar to surface tension, adsorption is a consequence of surface energy. In a bulk material, all the bonding requirements (be they ionic, covalent, or metallic) of the constituent atoms of the material are filled by other atoms in the material. However, atoms on the surface of the adsorbent are not wholly surrounded by other adsorbent atoms, and therefore can attract adsorbates. The exact nature of the bonding depends on the details of the species involved, but the adsorption process is generally classified as physisorption (characteristic of weak van der Waals forces) or chemisorption (characteristic of covalent bonding).
AERATION: The addition of air or oxygen to water or wastewater, usually by mechanical means, to increase dissolved oxygen levels and maintains aerobic conditions.
AEROBIC DIGESTION: Sludge stabilization process involving direct oxidation of biodegradable matter and oxidation of microbial cellular material.
AEROBIC: The condition of requiring oxygen; an aerobe is an organism which can live and grow only in the presence of oxygen.
AIR ENTRAINMENT: The dissolution or inclusion of air bubbles into water.
AIR GAP SEPARATION: A physical separation space that is present between the discharge vessel and the receiving vessel; for an example, a kitchen faucet.
ALCOHOL: Any of a class of organic compounds in which one or more - OH groups are attached to a carbon compound.
ALDEHYDE: An organic molecule with a carbonyl group located at the end of the carbon skeleton.
ALGAE: Microscopic plants that are free-living and usually live in water. They occur as single cells floating in water, or as multicellular plants like seaweed or strands of algae that attach to rocks.
ALKALINE: Having a pH of more than 7. Alkaline solutions are also said to be basic.
ALKALINITY: Alkalinity or AT is a measure of the ability of a solution to neutralize acids to the equivalence point of carbonate or bicarbonate. Alkalinity is closely related to the acid neutralizing capacity (ANC) of a solution and ANC is often incorrectly used to refer to alkalinity. However, the acid neutralizing capacity refers to the combination of the solution and solids present (e.g., suspended matter, or aquifer solids), and the contribution of solids can dominate the ANC (see carbonate minerals below). The alkalinity is equal to the stoichiometric sum of the bases in solution. In the natural environment carbonate alkalinity tends to make up most of the total alkalinity due to the common occurrence and dissolution of carbonate rocks and presence of carbon dioxide in the atmosphere. Other common natural components that can contribute to alkalinity include borate, hydroxide, phosphate, silicate, nitrate, dissolved ammonia, the conjugate bases of some organic acids and sulfide. Solutions produced in a laboratory may contain a virtually limitless number of bases that contribute to alkalinity. Alkalinity is usually given in the unit mEq/L (milliequivalent per liter). Commercially, as in the pool industry, alkalinity might also be given in the unit ppm or parts per million. Alkalinity is sometimes incorrectly used interchangeably with basicity. For example, the pH of a solution can be lowered by the addition of CO_2. This will reduce the basicity; however, the alkalinity will remain unchanged.
ALLANTOIS: One of the four extraembryonic membranes found associated with developing vertebrates; it serves in gas exchange and as a repository for the embryo's nitrogenous waste. In humans, the allantois is involved in early blood formation and development of the urinary bladder.
ALLELE: Alternate forms of a gene which may be found at a given location (locus) on members of a homologous set of chromosomes. Structural variations between alleles may lead to different phenotypes for a given trait.
ALLOMETRIC: The variation in the relative rates of growth of various parts of the body, which helps shape the organism.
ALLOSTERIC ENZYME: An enzyme that can exist in two or more conformations.
ALPHA AND BETA RADIOACTIVITY: Represent two common forms of radioactive decay. Radioactive elements have atomic nuclei so heavy that the nucleus will break apart, or disintegrate spontaneously. When decay occurs, high-energy particles are released. These high-energy particles are called radioactivity. Although radioactivity from refined radioactive elements can be dangerous, it is rare to find dangerous levels of radioactivity in natural waters. An alpha particle is a doubly-charged helium nucleus comprised of two protons, two neutrons, and no electrons. A beta particle is a high-speed electron. Alpha particles do not

penetrate matter easily, and are stopped by a piece of paper. Beta particles are much more penetrating and can pass through a millimeter of lead.

ALPHA EMITTERS: Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the EPA standard over many years may have an increased risk of getting cancer.

ALPHA HELIX: A spiral shape constituting one form of the secondary structure of proteins, arising from a specific hydrogen: bonding structure.

ALTERNATION OF GENERATIONS: Occurrences of a multicellular diploid form, the sporophyte, with a multicellular haploid form, the gametophyte.

ALTERNATIVE DISINFECTANTS: Disinfectants - other than chlorination (halogens) - used to treat water, e.g. ozone, ultraviolet radiation, chlorine dioxide, and chloramine. There is limited experience and scientific knowledge about the by-products and risks associated with the use of alternatives.

ALTRUISM: The willingness of an individual to sacrifice its fitness for the benefit of another.

ALUMINUM SULFATE: The chemical name for Alum. The molecular formula of Alum is $Al_2(SO_4)3\sim14H_2O$. It is a cationic polymer.

ALVEOLUS: One of the dead-end, multilobed air sacs that constitute the gas exchange surface of the lungs.

AMINO ACID: An organic molecule possessing a carboxyl (COOH) and amino group. Amino acids serve as the monomers of polypeptides and proteins.

AMINO GROUP: A functional group consisting of a nitrogen atom bonded to two hydrogens; can act as a base in solution, accepting a hydrogen ion and acquiring a charge of +1.

AMINOACYL: tRNA synthetases- A family of enzymes, at least one for each amino acid, that catalyze the attachment of an amino acid to its specific tRNA molecule.

AMMONIA: A chemical made with Nitrogen and Hydrogen and used with chlorine to disinfect water. Most ammonia in water is present as the ammonium ion rather than as ammonia.

AMOEBA: Amoeba (sometimes amœba or ameba, plural amoebae) is a genus of protozoa that moves by means of pseudopods, and is well-known as a representative unicellular organism. The word amoeba or ameba is variously used to refer to it and its close relatives, now grouped as the Amoebozoa, or to all protozoa that move using pseudopods, otherwise termed amoeboids.

AMOEBOID: (cell) A cell which has the tendency to change shape by protoplasmic flow. (movement) A streaming locomotion characteristic of Amoeba and other protists, as well as some individual cells, such as white blood cells, in animals.

AMP (Adenosine monophosphate): A singly phosphorylated organic compound that can be further phosphorylated to form ADP.

AMYLASE: A starch-digesting enzyme.

ANABOLISM: A metabolic pathway of biosynthesis that consumes energy to build a large molecule from simpler ones.

ANAEROBIC CONDITIONS: When anaerobic conditions exist in either the metalimnion or hypolimnion of a stratified lake or reservoir, water quality problems may make the water unappealing for domestic use without costly water treatment procedures. Most of these problems are associated with Reduction in the stratified waters.

ANAEROBIC DIGESTION: Sludge stabilization process where the organic material in biological sludges are converted to methane and carbon dioxide in an airtight reactor.

ANAEROBIC: Without oxygen. An organism that lives in the absence of oxygen is called an anaerobe. An abnormal condition in which color and odor problems are most likely to occur.

ANAGENESIS: A pattern of evolutionary change involving the transformation of an entire population, sometimes to a state different enough from the ancestral population to justify renaming it as a separate species; also called phyletic.

ANALOGOUS: Characteristics of organisms that are similar in function (and often in structure) but different in embryological and/or evolutionary origins.

ANALYST: The analyst must have at least 2 years of college lecture and laboratory course work in microbiology or a closely related field. The analyst also must have at least 6 months of continuous bench experience with environmental protozoa detection techniques and IFA microscopy, and must have successfully analyzed at least 50 water and/or wastewater samples for *Cryptosporidium* and *Giardia*. Six months of additional experience in the above areas may be substituted for two years of college.

ANCESTRAL TRAIT: Trait shared by a group of organisms as a result of descent from a common ancestor.

ANEUPLOIDY: A chromosomal aberration in which certain chromosomes are present in extra copies or are deficient in number.

ANION: A negatively charged ion.

ANISOGAMOUS: Reproducing by the fusion of gametes that differ only in size, as opposed to gametes that are produced by oogamous species. Gametes of oogamous species, such as egg cells and sperm, are highly differentiated.
ANOXIC: A biological environment that is deficient in molecular oxygen, but may contain chemically bound oxygen, such as nitrates and nitrites.
ANTERIOR: Referring to the head end of a bilaterally symmetrical animal.
ANTHROPOMORPHISM: Attributing a human characteristic to an inanimate object or a species other than a human.
ANTIBIOTIC: A chemical that kills or inhibits the growth of bacteria, often via transcriptional or translational regulation.
ANTIDIURETIC HORMONE: A hormone important in osmoregulation (it acts to reduce the elimination of water from the body.
ANTIGEN: A foreign macromolecule that does not belong to the host organism and that elicits an immune response.
ANTIMONY: A chemical element with the symbol Sb (Latin: stibium, meaning "mark") and atomic number 51. A metalloid, antimony has four allotropic forms. The stable form of antimony is a blue-white metalloid. Yellow and black antimony are unstable non-metals. Antimony is used in flame-proofing, paints, ceramics, enamels, a wide variety of alloys, electronics, and rubber.
APOMORPHIC CHARACTER: A derived phenotypic character, or homology, that evolved after a branch diverged from a phylogenetic tree.
APOSEMATIC COLORATION: Serving as a warning, with reference particularly to colors and structures that signal possession of defensive device.
AQUEOUS SOLUTION: A solution in which water is the solvent.
ARCHAEBACTERIA: A lineage of prokaryotes, represented today by a few groups of bacteria inhabiting extreme environments. Some taxonomists place archaebacteria in their own kingdom, separate from the other bacteria.
ARCHENTERON: The endoderm-lined cavity formed during the gastrulation process that develops into the digestive tract of the animal.
ARISTOTLE: A Greek philosopher often credited as the first to use empirical and deductive methods in logic.
ARTIFICIAL SELECTION: The selective breeding of domesticated plants and animals to encourage the occurrence of desirable traits.
AS NITROGEN: An expression that tells how the concentration of a chemical is expressed mathematically. The chemical formula for the nitrate ion is NO3 , with a mass of 62. The concentration of nitrate can be expressed either in terms of the nitrate ion or in terms of the principal element, nitrogen. The mass of the nitrogen atom is 14. The ratio of the nitrate ion mass to the nitrogen atom mass is 4.43. Thus a concentration of 10 mg/L nitrate expressed as nitrogen would be equivalent to a concentration of 44.3 mg/L nitrate expressed as nitrate ion. When dealing with nitrate numbers it is very important to know how numeric values are expressed.
AS: The chemical symbol of Arsenic.
ASCUS: The elongate spore sac of a fungus of the Ascomycota group.
ASEXUAL: A type of reproduction involving only one parent that produces genetically identical offspring by budding or division of a single cell or the entire organism into two or more parts.
ASSORTATIVE MATING: A type of nonrandom mating in which mating partners resemble each other in certain phenotypic characters.
ASYMMETRIC CARBON: A carbon atom covalently bonded to four different atoms or groups of atoms.
ATOM: The general definition of an ion is an atom with a positive or negative charge. Electron is the name of a negatively charged atomic particle.
ATOMIC NUMBER: The number of protons in the nucleus of an atom, unique for each element.
ATOMIC THEORY: The physical theory of the structure, properties and behavior of the atom.
ATOMIC WEIGHT: The total atomic mass, which is the mass in grams of one mole of the atom (relative to that of 12C, which is designated as 12).
ATP (Adenosine triphosphate): A triply phosphorylated organic compound that functions as "energy currency" for organisms, thus allowing life forms to do work; it can be hydrolyzed in two steps (first to ADP and then to AMP) to liberate 7.3 Kcal of energy per mole during each hydrolysis.
ATPASE: An enzyme that functions in producing or using ATP.
AUTOGENOUS MODEL: A hypothesis which suggests that the first eukaryotic cells evolved by the specialization of internal membranes originally derived from prokaryotic plasma membranes.
AUTOIMMUNE DISEASE: An immunological disorder in which the immune system goes awry and turns against itself.
AUTOPOLYPLOID: A type of polyploid species resulting from one species doubling its chromosome number to become tetraploids, which may self-fertilize or mate with other tetraploids.

AUTOSOME: Chromosomes that are not directly involved in determining sex.
AUTOTROPH: An organism which is able to make organic molecules from inorganic ones either by using energy from the sun or by oxidizing inorganic substances.
AUXIN: One of several hormone compounds in plants that have a variety of effects, such as phototropic response through stimulation of cell elongation, stimulation of secondary growth, and development of leaf traces and fruit.
AUXOTROPH: A nutritional mutant that is unable to synthesize and that cannot grow on media lacking certain essential molecules normally synthesized by wild-type strains of the same species.
AXON: A typically long outgrowth, or process, from a neuron that carries nerve impulses away from the cell body toward target cells.
AXONEME: An internal flagellar structure that occurs in some protozoa, such as *Giardia*, *Spironucleous*, and *Trichonmonas*.

B

BACKFLOW PREVENTION: To stop or prevent the occurrence of, the unnatural act of reversing the normal direction of the flow of liquid, gases, or solid substances back in to the public potable (drinking) water supply. See Cross-connection control.
BACKFLOW: To reverse the natural and normal directional flow of a liquid, gases, or solid substances back in to the public potable (drinking) water supply. This is normally an undesirable effect.
BACKSIPHONAGE: A liquid substance that is carried over a higher point. It is the method by which the liquid substance may be forced by excess pressure over or into a higher point.
BACTERIA: Small, one-celled animals too small to be seen by the naked eye. Bacteria are found everywhere, including on and in the human body. Humans would be unable to live without the bacteria that inhabit the intestines and assist in digesting food. Only a small percentage of bacteria cause disease in normal, healthy humans. Other bacteria can cause infections if they get into a cut or wound. Bacteria are the principal concern in evaluating the microbiological quality of drinking water, because some of the bacteria-caused diseases that can be transmitted by drinking water are potentially life-threatening.
BACTERIOPHAGE: A bacteriophage (from 'bacteria' and Greek phagein, 'to eat') is any one of a number of viruses that infect bacteria. The term is commonly used in its shortened form, phage. Typically, bacteriophages consist of an outer protein hull enclosing genetic material. The genetic material can be ssRNA (single stranded RNA), dsRNA, ssDNA, or dsDNA between 5 and 500 kilo base pairs long with either circular or linear arrangement. Bacteriophages are much smaller than the bacteria they destroy - usually between 20 and 200 nm in size.
BACTERIUM: A unicellular microorganism of the Kingdom Monera. Bacteria are prokaryotes; their cells have no true nucleus. Bacteria are classified into two groups based on a difference in cell walls, as determined by Gram staining.
BALANCED POLYMORPHISM: A type of polymorphism in which the frequencies of the coexisting forms do not change noticeably over many generations.
BARIUM: A chemical element. It has the symbol Ba, and atomic number 56. Barium is a soft silvery metallic alkaline earth metal. It is never found in nature in its pure form due to its reactivity with air. Its oxide is historically known as baryta but it reacts with water and carbon dioxide and is not found as a mineral. The most common naturally occurring minerals are the very insoluble barium sulfate, $BaSO_4$ (barite), and barium carbonate, $BaCO_3$ (witherite). Benitoite is a rare gem containing barium.
BARR BODY: The dense object that lies along the inside of the nuclear envelope in cells of female mammals, representing the one inactivated X chromosome.
BASAL BODY: A cell structure identical to a centriole that organizes and anchors the microtubule assembly of a cilium or flagellum.
BASE PAIRING: Complementary base pairing refers to the chemical affinities between specific base pairs in a nucleic acid: adenine always pairs with thymine, and guanine always pairs with cytosine. In pairing between DNA and RNA, the uracil of RNA always pairs with adenine. Complementary base pairing is not only responsible for the DNA double helix, but it is also essential for various in vitro techniques such as PCR (polymerase chain reaction). Complementary base pairing is also known as Watson-Crick pairing.
BASE: A substance that reduces the hydrogen ion concentration in a solution.
BASEMENT MEMBRANE: The floor of an epithelial membrane on which the basal cells rest.
B-CELL LYMPHOCYTE: A type of lymphocyte that develops in the bone marrow and later produces antibodies, which mediate humoral immunity.
BELT PRESS: A dewatering device utilizing two opposing synthetic fabric belts, revolving over a series of rollers to “squeeze” water from the sludge.
BENCH TEST: A small-scale test or study used to determine whether a technology is suitable for a particular application.
BENIGN TUMOR: A noncancerous abnormal growth composed of cells that multiply excessively but remain at their place of origin in the body.
BENTHIC: Pertaining to the bottom region of an aquatic environment.

BERYLLIUM: A chemical element with the symbol Be and atomic number 4. A bivalent element, beryllium is a steel grey, strong, light-weight yet brittle alkaline earth metal. It is primarily used as a hardening agent in alloys, most notably beryllium copper. Commercial use of beryllium metal presents technical challenges due to the toxicity (especially by inhalation) of beryllium-containing dusts.

BEST AVAILABLE TECHNOLOGY ECONOMICALLY ACHIEVABLE (BAT): A level of technology based on the best existing control and treatment measures that are economically achievable within the given industrial category or subcategory.

BEST MANAGEMENT PRACTICES (BMPs): Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the U.S. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

BEST PRACTICABLE CONTROL TECHNOLOGY CURRENTLY AVAILABLE (BPT): A level of technology represented by the average of the best existing wastewater treatment performance levels within an industrial category or subcategory.

BEST PROFESSIONAL JUDGMENT (BPJ): The method used by a permit writer to develop technology-based limitations on a case-by-case basis using all reasonably available and relevant data.

BETA PLEATED SHEET: A zigzag shape, constituting one form of the secondary structure of proteins formed of hydrogen bonds between polypeptide segments running in opposite directions.

BETA/PHOTON EMITTER: Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the EPA standard over many years may have an increased risk of getting cancer.

BILATERAL SYMMETRY: The property of having two similar sides, with definite upper and lower surfaces and anterior and posterior ends. The Bilateria are members of the branch of Eumetazoa (Kingdom Animalia) which possess bilateral symmetry.

BILE: A mixture of substances containing bile salts, which emulsify fats and aid in their digestion and absorption.

BINARY FISSION: The kind of cell division found in prokaryotes, in which dividing daughter cells each receive a copy of the single parental chromosome.

BINOMIAL NOMENCLATURE: Consisting of two names. In biology, each organism is given a *genus* name and a species name (i.e., the human is Homo sapiens.

BIOCHEMICAL OXYGEN DEMAND (BOD): The BOD test is used to measure the strength of wastewater. The BOD of wastewater determines the milligrams per liter of oxygen required during stabilization of decomposable organic matter by aerobic bacteria action. Also, the total milligrams of oxygen required over a five-day test period to biologically assimilate the organic contaminants in one liter of wastewater maintained at 20 degrees Centigrade.

BIOGENESIS: A central concept of biology, that living organisms are derived from other living organisms (contrasts to the concept of abiogenesis, or spontaneous generation, which held that life could be derived from inanimate material).

BIOLOGICAL MAGNIFICATION: Increasing concentration of relatively stable chemicals as they are passed up a food chain from initial consumers to top predators.

BIOMASS: The total weight of all the organisms, or of a designated group of organisms, in a given area

BIOME: A large climatic region with characteristic sorts of plants and animals.

BIOSOLIDS: Solid organic matter recovered from municipal wastewater treatment that can be beneficially used, especially as a fertilizer. “Biosolids” are solids that have been stabilized within the treatment process, whereas “sludge” has not.

BIOSPHERE: The region on and surrounding the earth which is capable of supporting life. Theoretically, the concept may be ultimately expanded to include other regions of the universe.

BMR: The basal metabolic rate is the minimal energy (in kcal) required by a homeotherm to fuel itself for a given time. Measured within the thermoneutral zone for a postabsorptive animal at rest.

BODY FEED: Coating or bulking material added to the influent of material to be treated. This adds “body” to the material during filtration cycle.

Both measurements (mg/L or KH) are usually expressed "as $CaCO_3$" – meaning the amount of hardness expressed as if calcium carbonate was the sole source of hardness. Every bicarbonate ion only counts for half as much carbonate hardness as a carbonate ion does. If a solution contained 1 liter of water and 50 mg $NaHCO_3$ (baking soda), it would have a carbonate hardness of about 18 mg/L as $CaCO_3$. If you had a liter of water containing 50 mg of Na_2CO_3, it would have a carbonate hardness of about 29 mg/L as $CaCO_3$. Carbonate hardness supplements non-carbonate (a.k.a. "permanent") hardness where hard ions are associated with anions such as Chloride that do not precipitate out of solution when heated. Carbonate hardness is removed from water through the process of softening. Softening can be achieved by adding lime in the form of $Ca(OH)_2$, which reacts first with CO_2 to form calcium carbonate precipitate, reacts next with multi-valent cations to remove carbonate hardness, then reacts with anions to replace the non-carbonate hardness due to multi-valent cations with non-carbonate hardness due to calcium. The process requires recarbonation through the addition of carbon-dioxide to lower the pH which is raised during the initial softening process.

BREAK POINT CHLORINATION: The process of chlorinating the water with significant quantities of chlorine to oxidize all contaminants and organic wastes and leave all remaining chlorine as free chlorine.

BROMATE: An inorganic anion, bromate is tasteless and colorless, with a low volatility. As a moderately strong oxidant, bromate is reactive. BrO3- is a bromine-based oxoanion. A bromate is a chemical compound that contains this ion. Examples of bromates include sodium bromate, (NaBrO3), and potassium bromate, (KBrO3).

BROMINE: Chemical disinfectant (HALOGEN) that kills bacteria and algae. This chemical disinfectant has been used only on a very limited scale for water treatment because of its handling difficulties. This chemical causes skin burns on contact, and a residual is difficult to obtain.

BUFFER: Chemical that resists pH change, e.g. sodium bicarbonate

BULKING SLUDGE: A poor or slow settling activated sludge that results from the prevalence of filamentous organisms. A phenomenon that occurs in activated sludge plants whereby the sludge occupies excessive volumes and will not concentrate readily. This condition refers to a decrease in the ability of the sludge to settle and consequent loss over the settling tank weir. Bulking in activated sludge aeration tanks is caused mainly by excess suspended solids (SS) content. Sludge bulking in the final settling tank of an activated sludge plant may be caused by improper balance of the BOD load, SS concentration in the mixed liquor, or the amount of air used in aeration.

C

Ca: The chemical symbol for calcium.

CADMIUM: A chemical element with the symbol Cd and atomic number 48. A relatively abundant, soft, bluish-white, transition metal, cadmium is known to cause cancer and occurs with zinc ores. Cadmium is used largely in batteries and pigments, for example in plastic products.

CAKE: Dewatered sludge material with a satisfactory solids concentration to allow handling as a solid material.

CALCIUM HARDNESS: A measure of the calcium salts dissolved in water.

CALCIUM ION: Is divalent because it has a valence of +2.

CALCIUM, MAGNESIUM AND IRON: The three elements that cause hardness in water.

$CaOCl_2.4H_2O$: The molecular formula of Calcium hypochlorite.

CARBON DIOXIDE GAS: The pH will decrease and alkalinity will change as measured by the Langelier index after pumping carbon dioxide gas into water.

CARBONATE HARDNESS: Carbonate hardness is the measure of Calcium and Magnesium and other hard ions associated with carbonate ($CO_3$2-) and bicarbonate (HCO_3-) ions contained in a solution, usually water. It is usually expressed either as parts per million (ppm or mg/L), or in degrees (KH - from the German "Karbonathärte"). One German degree of carbonate hardness is equivalent to about 17.8575 mg/L.

CARBONATE, BICARBONATE AND HYDROXIDE: Chemicals that are responsible for the alkalinity of water.

CATHODIC PROTECTION: An operator should protect against corrosion of the anode and/or the cathode by painting the copper cathode. Cathodic protection interrupts corrosion by supplying an electrical current to overcome the corrosion-producing mechanism. Guards against stray current corrosion.

CAUSTIC SODA: Also known as sodium hydroxide and is used to raise pH.

CAUSTIC: NaOH (also called Sodium Hydroxide) is a strong chemical used in the treatment process to neutralize acidity, increase alkalinity or raise the pH value.

CENTRATE: The liquid remaining after solids have been removed in a centrifuge.

CENTRIFUGAL FORCE: That force when a ball is whirled on a string that pulls the ball outward. On a centrifugal pump, that force throws water from a spinning impeller.

CENTRIFUGAL PUMP: A pump consisting of an impeller fixed on a rotating shaft and enclosed in a casing, having an inlet and a discharge connection. The rotating impeller creates pressure in the liquid by the velocity derived from centrifugal force.

CENTRIFUGE: A dewatering device relying on centrifugal force to separate particles of varying density such as water and solids.

CHAIN OF CUSTODY (COC): A record of each person involved in the possession of a sample from the person who collects the sample to the person who analyzes the sample in the laboratory.

CHECK VALVE: Allows water to flow in only one direction.

CHELATION: A chemical process used to control scale formation in which a chelating agent "captures" scale-causing ions and holds them in solution.

CHEMICAL FEED RATE: Chemicals are added to the water in order to improve the subsequent treatment processes. These may include pH adjusters and coagulants. Coagulants are chemicals, such as alum, that neutralize positive or negative charges on small particles, allowing them to stick together and form larger particles that are more easily removed by sedimentation (settling) or filtration. A variety of devices, such as

baffles, static mixers, impellers and in-line sprays, can be used to mix the water and distribute the chemicals evenly.
CHEMICAL OXIDIZER: $KMnO_4$ is used for taste and odor control because it is a strong oxidizer that eliminates many organic compounds.
CHEMICAL OXYGEN DEMAND (COD): The milligrams of oxygen required to chemically oxidize the organic contaminants in one liter of wastewater.
CHEMICAL REACTION RATE: In general, when the temperature decreases, the chemical reaction rate also decreases. The opposite is true for when the temperature increases.
CHEMICAL SLUDGE: Sludge resulting from chemical treatment processes of inorganic wastes that are not biologically active.
CHLORAMINATION: Treating drinking water by applying chlorine before or after ammonia. This creates a persistent disinfectant residual called chloramines.
CHLORAMINES: A group of chlorine ammonia compounds formed when chlorine combines with organic wastes in the water. Chloramines are not effective as disinfectants and are responsible for eye and skin irritation as well as strong chlorine odors (also known as Combined Chlorine).
CHLORINATION: The process in water treatment of adding chlorine (gas or solid hypochlorite) for purposes of disinfection.
CHLORINE DEMAND: Amount of chlorine required to react on various water impurities before a residual is obtained. Also, means the amount of chlorine required to produce a free chlorine residual of 0.1 mg/l after a contact time of fifteen minutes as measured by Iodometric method of a sample at a temperature of twenty degrees in conformance with Standard methods.
CHLORINE FEED: Chlorine may be delivered by vacuum-controlled solution feed chlorinators. The chlorine gas is controlled, metered, introduced into a stream of injector water and then conducted as a solution to the point of application.
CHLORINE, FREE: Chlorine available to kill bacteria or algae. The amount of chlorine available for sanitization after the chlorine demand has been met. Also known as chlorine residual.
CHLORINE: A chemical used to disinfect water. Chlorine is extremely reactive, and when it comes in contact with microorganisms in water it kills them. Chlorine is added to swimming pools to keep the water safe for swimming. Chlorine is available as solid tablets for swimming pools. Some public water system's drinking water treatment plants use chlorine in a gas form because of the large volumes required. Chlorine is very effective against algae, bacteria and viruses. Protozoa are resistant to chlorine because they have thick coats; protozoa are removed from drinking water by filtration.
CHLORITE: The chlorite ion is ClO_2^-. A chlorite (compound) is a compound that contains this group, with chlorine in oxidation state +3. Chlorites are also known as salts of chlorous acid.
CHROMIUM: A chemical element which has the symbol Cr and atomic number 24. It is a steel-gray, lustrous, hard metal that takes a high polish and has a high melting point. It is also odorless, tasteless, and malleable.
CHRONIC: A stimulus that lingers or continues for a relatively long period of time, often one-tenth of the life span or more. Chronic should be considered a relative term depending on the life span of an organism. The measurement of chronic effect can be reduced growth, reduced reproduction, etc., in addition to lethality.
CIRCULATION: The continual flow of drilling fluid from injection to recovery and recirculation at the surface.
CLARIFIER: A settling tank used to remove suspended solids by gravity settling. Commonly referred to as sedimentation or settling basins, they are usually equipped with a motor driven chain and flight or rake mechanism to collect settled sludge and move it to a final removal point.
ClO_2: The molecular formula of Chlorine dioxide.
COAGULATION: The best pH range for coagulation is between 5 and 7. Mixing is an important part of the coagulation process you want to complete the coagulation process as quickly as possible. A chemical added to initially destabilize, aggregate, and bind together colloids and emulsions to improve settleability, filterability, or drainability.
COLIFORM TESTING: The effectiveness of disinfection is usually determined by Coliform bacteria testing. A positive sample is a bad thing and indicates that you have bacteria contamination.
COLIFORM: Bacteria normally found in the intestines of warm-blooded animals. Coliform bacteria are present in high numbers in animal feces. They are an indicator of potential contamination of water. Adequate and appropriate disinfection effectively destroys coliform bacteria. Public water systems are required to deliver safe and reliable drinking water to their customers 24 hours a day, 365 days a year. If the water supply becomes contaminated, consumers can become seriously ill. Fortunately, public water systems take many steps to ensure that the public has safe, reliable drinking water. One of the most important steps is to regularly test the water for coliform bacteria. Coliform bacteria are organisms that are present in the environment and in the feces of all warm-blooded animals and humans. Coliform bacteria will not likely cause illness. However, their presence in drinking water indicates that disease-causing organisms (pathogens) could be in the water system. Most pathogens that can contaminate water supplies come from

the feces of humans or animals. Testing drinking water for all possible pathogens is complex, time-consuming, and expensive. It is relatively easy and inexpensive to test for coliform bacteria. If coliform bacteria are found in a water sample, water system operators work to find the source of contamination and restore safe drinking water. There are three different groups of coliform bacteria; each has a different level of risk.

COLLOIDAL SUSPENSIONS: Because both iron and manganese react with dissolved oxygen to form insoluble compounds, they are not found in high concentrations in waters containing dissolved oxygen except as colloidal suspensions of the oxide.

COLORIMETRIC MEASUREMENT: A means of measuring an unknown chemical concentration in water by measuring a sample's color intensity.

COMBINED CHLORINE: The reaction product of chlorine with ammonia or other pollutants, also known as chloramines.

COMBINED RADIUM 226/228: Some people who drink water containing radium 226 or 228 in excess of EPA standard over many years may have an increased risk of getting cancer.

COMPOSITE SAMPLE: A water sample that is a combination of a group of samples collected at various intervals during the day. A combination of individual samples of water or wastewater taken at predetermined intervals to minimize the effect of variability of individual samples. To have significant meaning, samples for laboratory tests on wastewater should be representative of the wastewater. The best method of sampling is proportional composite sampling over several hours during the day. Composite samples are collected because the flow and characteristics of the wastewater are continually changing. A composite sample will give a representative analysis of the wastewater conditions.

COMPOSTING: Stabilization process relying on the aerobic decomposition of organic matter in sludge by bacteria and fungi.

CONDENSATION: The process that changes water vapor to tiny droplets or ice crystals.

CONTACT STABILIZATION PROCESS: Modification of the activated sludge process where raw wastewater is aerated with activated sludge for a short time prior to solids removal and continued aeration in a stabilization tank.

CONTACT TIME (CT): To inactivate viruses and bacteria, the minimum disinfection contact time measured before the first customer should be six milligrams per minute per liter (6 mg-min/L). This value is called "Chlorine Contact Time" or CT. To calculate CT, multiply the free chlorine residual concentration (C) times the contact time (T). To get the required CT value of 6, adjust the free chlorine residual concentration or the contact time.

CONTACT TIME: If the water temperature decreases from 70°F (21°C) to 40°F (4°C). The operator needs to increase the detention time to maintain good disinfection of the water.

CONTAMINANT: Any natural or man-made physical, chemical, biological, or radiological substance or matter in water, which is at a level that may have an adverse effect on public health, and which is known or anticipated to occur in public water systems.

CONTAMINATION: A degradation in the quality of groundwater in result of the it's becoming polluted with unnatural or previously non-existent constituents.

COPPER: The chemical name for the symbol Cu.

CORROSION: The removal of metal from copper, other metal surfaces and concrete surfaces in a destructive manner. Corrosion is caused by improperly balanced water or excessive water velocity through piping or heat exchangers.

CORROSIVITY: The Langelier Index measures corrosivity.

CROSS-CONNECTION: A physical connection between a public water system and any source of water or other substance that may lead to contamination of the water provided by the public water system through backflow. Might be the source of an organic substance causing taste and odor problems in a water distribution system.

CROSS-CONTAMINATION: The mixing of two unlike qualities of water. For example, the mixing of good water with a polluting substance like a chemical.

CRYPTOSPORIDIUM: A disease-causing parasite, resistant to chlorine disinfection. It may be found in fecal matter or contaminated drinking water. Cryptosporidium is a protozoan pathogen of the Phylum Apicomplexa and causes a diarrheal illness called cryptosporidiosis. Other apicomplexan pathogens include the malaria parasite Plasmodium, and Toxoplasma, the causative agent of toxoplasmosis. Unlike Plasmodium, which transmits via a mosquito vector, Cryptosporidium does not utilize an insect vector and is capable of completing its life cycle within a single host, resulting in cyst stages that are excreted in feces and are capable of transmission to a new host.

CRYPTOSPORIDIUM: A parasite that enters lakes and rivers through sewage and animal waste. It causes cryptosporidiosis, a mild gastrointestinal disease. However, the disease can be severe or fatal for people with severely weakened immune systems. The EPA and the CDC have prepared advice for those with severely compromised immune systems who are concerned about Cryptosporidium.

CYANOBACTERIA: Cyanobacteria, also known as blue-green algae, blue-green bacteria or Cyanophyta, is a phylum of bacteria that obtain their energy through photosynthesis. The name "cyanobacteria" comes from the color of the bacteria (Greek: kyanós = blue). They are a significant component of the marine nitrogen cycle and an important primary producer in many areas of the ocean, but are also found on land.
CYANURIC ACID: Chemical used to prevent the decomposition of chlorine by ultraviolet (UV) light.
CYST: A phase or a form of an organism produced either in response to environmental conditions or as a normal part of the life cycle of the organism. It is characterized by a thick and environmentally resistant cell wall.

D

DAILY MAXIMUM LIMITATIONS: The maximum allowable discharge of pollutants during a 24 hour period. Where daily maximum limitations are expressed in units of mass, the daily discharge is the total mass discharged over the course of the day. Where daily maximum limitations are expressed in terms of a concentration, the daily discharge is the arithmetic average measurement of the pollutant concentration derived from all measurements taken that day.
DANGEROUS CHEMICALS: The most suitable protection when working with a chemical that produces dangerous fumes is to work under an air hood.
DECANT: Separation of a liquid from settled solids by removing the upper layer of liquid after the solids have settled.
DECOMPOSE: To decay or rot.
DECOMPOSITION OF ORGANIC MATERIAL: The decomposition of organic material in water produces taste and odors.
DEMINERALIZATION PROCESS: Mineral concentration of the feed water is the most important consideration in the selection of a demineralization process. Acid feed is the most common method of scale control in a membrane demineralization treatment system.
DENITRIFICATION: A biological process by which nitrate is converted to nitrogen gas.
DEPOLARIZATION: The removal of hydrogen from a cathode.
DESICCANT: When shutting down equipment that may be damaged by moisture, the unit may be protected by sealing it in a tight container. This container should contain a desiccant.
DESORPTION: Desorption is a phenomenon whereby a substance is released from or through a surface. The process is the opposite of sorption (that is, adsorption and absorption). This occurs in a system being in the state of sorption equilibrium between bulk phase (fluid, i.e. gas or liquid solution) and an adsorbing surface (solid or boundary separating two fluids). When the concentration (or pressure) of substance in the bulk phase is lowered, some of the sorbed substance changes to the bulk state. In chemistry, especially chromatography, desorption is the ability for a chemical to move with the mobile phase. The more a chemical desorbs, the less likely it will adsorb, thus instead of sticking to the stationary phase, the chemical moves up with the solvent front. In chemical separation processes, stripping is also referred to as desorption as one component of a liquid stream moves by mass transfer into a vapor phase through the liquid-vapor interface.
DIATOMACEOUS EARTH: A fine silica material containing the skeletal remains of algae.
DIGESTER: A tank or vessel used for sludge digestion.
DIGESTION: The biological decomposition of organic matter in sludge resulting in partial gasification, liquefaction, and mineralization of putrescible and offensive solids.
DIRECT CURRENT: A source of direct current (**DC**) may be used for standby lighting in a water treatment facility. The electrical current used in a DC system may come from a battery.
DISINFECT: The application of a chemical to kill most, but not all, microorganisms that may be present. Chlorine is added to public water drinking systems drinking water for disinfection. Depending on your state rule, drinking water must contain a minimum of 0.2 mg/L free chlorine. Disinfection makes drinking water safe to consume from the standpoint of killing pathogenic microorganisms including bacteria and viruses. Disinfection does not remove all bacteria from drinking water, but the bacteria that can survive disinfection with chlorine are not pathogenic bacteria that can cause disease in normal healthy humans.
DISINFECTION BYPRODUCTS: Disinfection byproducts are chemical, organic and inorganic substances that can form during a reaction of a disinfectant with naturally present organic matter in the water.
DISINFECTION: The treatment of water to inactivate, destroy, and/or remove pathogenic bacteria, viruses, protozoa, and other parasites.
DISSOLVED OXYGEN: Can be added to zones within a lake or reservoir that would normally become anaerobic during periods of thermal stratification.
DISSOLVED SOLIDS: Solids in solution that cannot be removed by filtration with a 0.45 micron filter.
DISTILLATION, REVERSE OSMOSIS AND FREEZING: Processes that can be used to remove minerals from the water.
DPD METHOD: Presence of free chlorine in the distribution network is indication of correct disinfection. Chlorine in water is determined according to ISO 7393-2 by colorimetric HACH method on the basis of DPD

(N, N-diethyl - p – phenylendiamine). The photometric detection uses the wave lengths of 490 – 555 nm. Hach elected, for most of his DPD colorimetric systems, the wavelength of 530 nm.
DRY ACID: A granular chemical used to lower pH and or total alkalinity.

E

E. COLI, Escherichia coli: A bacterium commonly found in the human intestine. For water quality analyses purposes, it is considered an indicator organism. These are considered evidence of water contamination. Indicator organisms may be accompanied by pathogens, but do not necessarily cause disease themselves.
ECOLOGY: The study of how organisms interact with their environments.
ECOSYSTEM: The sum of physical features and organisms occurring in a given area.
ECTODERM: The outermost tissue layer of an animal embryo. Also, tissue derived from an embryonic ectoderm.
EFFECTIVENESS OF CHLORINE: The factors which influence the effectiveness of chlorination the most are pH, turbidity and temperature. Effectiveness of Chlorine decreases occurs during disinfection in source water with excessive turbidity.
EFFECTOR: The part of an organism that produces a response to a stimulus.
EFFLUENT: Partially or completely treated water or wastewater flowing out of a basin or treatment plant.
ELECTRON MICROSCOPE: A microscope that focuses an electron beam through a specimen, resulting in resolving power a thousandfold greater than that of a light microscope. A transmission EM is used to study the internal structure of thin sections of cells; a scanning EM is used to study the ultrastructure of surfaces.
ELECTRON TRANSPORT CHAIN: A series of enzymes found in the inner membranes of mitochondria and chloroplasts. These are involved in transport of protons and electrons either across the membrane during ATP synthesis.
ELECTRON: The name of a negatively charged atomic particle. A negatively charged subatomic particle of an atom or ion. In atoms, the number of electrons present is equal to the number of positively charged protons present. Hence, atoms are electrically neutral.
ELECTRONEGATIVITY: A property exhibited by some atoms whereby the nucleus has a tendency to pull electrons toward itself.
ELECTRONIC CHARGE UNIT: The charge of one electron (1.6021 x 10e - 19 coulomb).
ELECTROSTATIC FORCE: The attraction between particles with opposite charges.
ELECTROSTATIC GRADIENT: The free-energy gradient created by a difference in charge between two points, generally the two sides of a membrane.
ELEMENT: Any substance that cannot be broken down into another substance by ordinary chemical means.
ELIMINATION: The release of unabsorbed wastes from the digestive tract.
EMULSION: A suspension, usually as fine droplets of one liquid in another. A mixture made up of dissimilar elements, usually of two or more mutually insoluble liquids that would normally separate into layers based on the specific gravity of each liquid.
ENDERGONIC: A phenomenon that involves uptake of energy.
ENDOCRINE: A phenomenon that relates to the presence of ductless glands of the type typically found in vertebrates. The endocrine system involves hormones, the glands that secrete them, the molecular hormone receptors of target cells, and interactions between hormones and the nervous system.
ENDONUCLEASE: An enzyme that breaks bonds within nucleic acids. A restriction endonuclease is an enzyme that breaks bonds only within a specific sequence of bases.
ENDOPLASMIC RETICULUM: A system of membrane-bounded tubes and flattened sacs, often continuous with the nuclear envelope, found in the cytoplasm of eukaryotes. Exists as rough ER, studded with ribosomes, and smooth ER, lacking ribosomes.
ENDORPHIN: A hormone produced in the brain and anterior pituitary that inhibits pain perception.
ENDOSKELETON: An internal skeleton.
ENDOSPERM: A nutritive material in plant seeds which is triploid (3n) and results from the fusion of three nuclei during double fertilization.
ENDOSYMBIOTIC: 1) An association in which the symbiont lives within the host 2) A widely accepted hypothesis concerning the evolution of the eukaryotic cell: the idea that eukaryotes evolved as a result of symbiotic associations between prokaryote cells. Aerobic symbionts ultimately evolved into mitochondria; photosynthetic symbionts became chloroplasts.
ENERGY: The capacity to do work by moving matter against an opposing force.
ENTAMOEBA HISTOLYTICA: Entamoeba histolytica, another water-borne pathogen, can cause diarrhea or a more serious invasive liver abscess. When in contact with human cells, these amoebae are cytotoxic. There is a rapid influx of calcium into the contacted cell, it quickly stops all membrane movement save for some surface blebbing. Internal organization is disrupted, organelles lyse, and the cell dies. The ameba may eat the dead cell or just absorb nutrients released from the cell.
ENTERIC: Rod-shaped, gram-negative, aerobic but can live in certain anaerobic conditions; produce nitrite from nitrate, acids from glucose; include Escherichia coli, Salmonella (over 1000 types), and Shigella.

ENTEROVIRUS: A virus whose presence may indicate contaminated water; a virus that may infect the gastrointestinal tract of humans.
ENTROPY: A type of energy that is not biologically useful to do work (in contrast to free energy).
ENVELOPE: 1) (nuclear) The surface, consisting of two layers of membrane, that encloses the nucleus of eukaryotic cells. 2) (virus) A structure which is present on the outside of some viruses (exterior to the capsid).
ENVIRONMENT: Water, air, and land, and the interrelationship that exists among and between water, air and land and all living things. The total living and nonliving aspects of an organism's internal and external surroundings.
ENZYME: A protein, on the surface of which are chemical groups so arranged as to make the enzyme a catalyst for a chemical reaction.
EPIDERMIS: The outermost portion of the skin or body wall of an animal.
EPISOME: Genetic element at times free in the cytoplasm, at other times integrated into a chromosome.
EPISTASIS: A phenomenon in which one gene alters the expression of another gene that is independently inherited.
EPITHELIUM: An animal tissue that forms the covering or lining of all free body surfaces, both external and internal.
EQUATION: A precise representation of the outcome of a chemical reaction, showing the reactants and products, as well as the proportions of each.
EQUILIBRIUM: In a reversible reaction, the point at which the rate of the forward reaction equals that of the reverse reaction. (constant) At equilibrium, the ratio of products to reactants. (potential) The membrane potential for a given ion at which the voltage exactly balances the chemical diffusion gradient for that ion.
ESSENTIAL: 1) An amino or fatty acid which is required in the diet of an animal because it cannot be synthesized. 2) A chemical element required for a plant to grow from a seed and complete the life cycle.
ESTIVATION: A physiological state characterized by slow metabolism and inactivity, which permits survival during long periods of elevated temperature and diminished water supplies.
EUBACTERIA: The lineage of prokaryotes that includes the cyanobacteria and all other contemporary bacteria except archaebacteria.
EUCHROMATIN: The more open, unraveled form of eukaryotic chromatin, which is available for transcription.
EUCOELOMATE: An animal whose body cavity is completely lined by mesoderm, the layers of which connect dorsally and ventrally to form mesenteries.
EUGLENA: Euglena are common protists, of the class Euglenoidea of the phylum Euglenophyta. Currently, over 1000 species of Euglena have been described. Marin et al. (2003) revised the genus so and including several species without chloroplasts, formerly classified as Astasia and Khawkinea. Euglena sometimes can be considered to have both plant and animal features. Euglena gracilis has a long hair-like thing that stretches from its body. You need a very powerful microscope to see it. This is called a flagellum, and the euglena uses it to swim. It also has a red eyespot. Euglena gracilis uses its eyespot to locate light. Without light, it cannot use its chloroplasts to make itself food.
EUKARYOTE: A life form comprised of one or more cells containing a nucleus and membrane - bound organelles. Included are members of the Kingdoms Protista, Fungi, Plantae and Animalia.
EUMETAZOA: Members of the subkingdom that includes all animals except sponges.
EUTROPHIC: A highly productive condition in aquatic environments which owes to excessive concentrations of nutrients which support the growth of primary producers.
EVAGINATED: Folded or protruding outward.
EVAPORATIVE COOLING: The property of a liquid whereby the surface becomes cooler during evaporation, owing to the loss of highly kinetic molecules to the gaseous state.
EVERSIBLE: Capable of being turned inside out.
EXCITABLE CELLS: A cell, such as a neuron or a muscle cell that can use changes in its membrane potential to conduct signals.
EXCRETION: Release of materials which arise in the body due to metabolism (e.g., CO_2, NH_3, H_20).
EXERGONIC: A phenomenon which involves the release of energy.
EXOCYTOSIS: A process by which a vesicle within a cell fuses with the plasma membrane and releases its contents to the outside.
EXON: A part of a primary transcript (and the corresponding part of a gene) that is ultimately either translated (in the case of mRNA) or utilized in a final product, such as tRNA.
EXOSKELETON: An external skeleton, characteristic of members of the phylum, Arthropoda.
EXOTHERMIC: A process or reaction that is accompanied by the creation of heat.
EXOTOXIN: A toxic protein secreted by a bacterial cell that produces specific symptoms even in the absence of the bacterium.
EXTRINSIC: External to, not a basic part of; as in extrinsic isolating mechanism.
F

F PLASMID: The fertility factor in bacteria, a plasmid that confers the ability to form pili for conjugation and associated functions required for transfer of DNA from donor to recipient.
F: The chemical symbol of Fluorine.
FACILITATED DIFFUSION: Passive movement through a membrane involving a specific carrier protein; does not proceed against a concentration gradient.
FACULTATIVE: An organism which exhibits the capability of changing from one habit or metabolic pathway to another, when conditions warrant. (anaerobe) An organism that makes ATP by aerobic respiration if oxygen is present but that switches to fermentation under anaerobic conditions.
FAT: A biological compound consisting of three fatty acids linked to one glycerol molecule.
FATTY ACID: A long carbon chain carboxylic acid. Fatty acids vary in length and in the number and location of double bonds; three fatty acids linked to a glycerol molecule form fat.
FAUNA: The animals of a given area or period.
FECAL COLIFORM: A group of bacteria that may indicate the presence of human or animal fecal matter in water. Total coliform, fecal coliform, and E. coli are all indicators of drinking water quality. The total coliform group is a large collection of different kinds of bacteria. Fecal coliforms are types of total coliform that mostly exist in feces. E. coli is a sub-group of fecal coliform. When a water sample is sent to a lab, it is tested for total coliform. If total coliform is present, the sample will also be tested for either fecal coliform or E. coli, depending on the lab testing method.
FECAL COLIFORM: Fecal Coliform and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms.
FECES: Indigestible wastes discharged from the digestive tract.
FEEDBACK: The process by which a control mechanism is regulated through the very effects it brings about. Positive feedback is when the effect is amplified; negative feedback is when the effect tends toward restoration of the original condition. Feedback inhibition is a method of metabolic control in which the end-product of a metabolic pathway acts as an inhibitor of an enzyme within that pathway.
FERMENTATION: Anaerobic production of alcohol, lactic acid or similar compounds from carbohydrate resulting from glycolysis.
FERRIC CHLORIDE: An iron salt commonly used as a coagulant. Chemical formula is FeCl3.
FILTER AID: A polymer or other material added to improve the effectiveness of the filtration process.
FILTER CAKE: The layer of solids that is retained on the surface of a filter.
FILTER CLOGGING: An inability to meet demand may occur when filters are clogging.
FILTER PRESS: A dewatering device where sludge is pumped onto a filtering medium and water is forced out of the sludge, resulting in a "cake".
FILTER: A device utilizing a granular material, woven cloth or other medium to remove pollutants from water, wastewater or air.
FILTRATE: Liquid remaining after removal of solids with filtration.
FILTRATION RATE: A measurement of the volume of water applied to a filter per unit of surface area in a given period of time.
FITNESS: The extent to which an individual passes on its genes to the next generation. Relative fitness is the number of offspring of an individual compared to the mean.
FIXATION: 1) Conversion of a substance into a biologically more usable form, for example, CO_2 fixation during photosynthesis and N_2 fixation. 2) Process of treating living tissue for microscopic examination.
FIXED ACTION PATTERN (FAP): A highly: stereotyped behavior that is innate and must be carried to completion once initiated.
FLACCID: Limp; walled cells are flaccid in isotonic surroundings, where there is no tendency for water to enter.
FLAGELLIN: The protein from which prokaryotic flagella are constructed.
FLAGELLUM: A long whip-like appendage that propels cells during locomotion in liquid solutions. The prokaryote flagellum is comprised of a protein, flagellin. The eukaryote flagellum is longer than a cilium, but as a similar internal structure of microtubules in a"9 + 2" arrangement.
FLAME CELL: A flagellated cell associated with the simplest tubular excretory system, present in flatworms: it acts to directly regulate the contents of the extracellular fluid.
FLOC SHEARING: Likely to happen to large floc particles when they reach the flocculation process.
FLOCCULANTS: Flocculants, or flocculating agents, are chemicals that promote flocculation by causing colloids and other suspended particles in liquids to aggregate, forming a floc. Flocculants are used in water treatment processes to improve the sedimentation or filterability of small particles. For example, a flocculant may be used in swimming pool or drinking water filtration to aid removal of microscopic particles which would otherwise cause the water to be cloudy and which would be difficult or impossible to remove by filtration alone. Many flocculants are multivalent cations such as aluminum, iron, calcium or magnesium. These positively charged molecules interact with negatively charged particles and molecules to reduce the barriers to aggregation. In addition, many of these chemicals, under appropriate pH and other conditions

such as temperature and salinity, react with water to form insoluble hydroxides which, upon precipitating, link together to form long chains or meshes, physically trapping small particles into the larger floc. Long-chain polymer flocculants, such as modified polyacrylamides, are manufactured and sold by the flocculant producing business. These can be supplied in dry or liquid form for use in the flocculation process. The most common liquid polyacrylamide is supplied as an emulsion with 10-40 % actives and the rest is a carrier fluid, surfactants and latex. Emulsion polymers require activation to invert the emulsion and allow the electrolyte groups to be exposed.

FLOCCULATION BASIN: A compartmentalized basin with a reduction of speed in each compartment. This set-up or basin will give the best overall results.

FLOCCULATION: The process of bringing together destabilized or coagulated particles to form larger masses that can be settled and/or filtered out of the water being treated. Conventional coagulation–flocculation-sedimentation practices are essential pretreatments for many water purification systems—especially filtration treatments. These processes agglomerate suspended solids together into larger bodies so that physical filtration processes can more easily remove them. Particulate removal by these methods makes later filtering processes far more effective. The process is often followed by gravity separation (sedimentation or flotation) and is always followed by filtration. A chemical coagulant, such as iron salts, aluminum salts, or polymers, is added to source water to facilitate bonding among particulates. Coagulants work by creating a chemical reaction and eliminating the negative charges that cause particles to repel each other. The coagulant-source water mixture is then slowly stirred in a process known as flocculation. This water churning induces particles to collide and clump together into larger and more easily removable clots, or “flocs.” The process requires chemical knowledge of source water characteristics to ensure that an effective coagulant mix is employed. Improper coagulants make these treatment methods ineffective. The ultimate effectiveness of coagulation/flocculation is also determined by the efficiency of the filtering process with which it is paired.

FLOOD RIM: The point of an object where the water would run over the edge of something and begin to cause a flood.

FLORA: The plants of a given area or period.

FLOW CYTOMETER: A particle-sorting instrument capable of counting protozoa.

FLUID FEEDER: An animal that lives by sucking nutrient-rich fluids from another living organism.

FLUID MOSAIC MODEL: The currently accepted model of cell membrane structure, which envisions the membrane as a mosaic of individually inserted protein molecules drifting laterally in a fluid bilayer of phospholipids.

FLUX: The term flux describes the rate of water flow through a semipermeable membrane. When the water flux decreases through a semipermeable membrane, it means that the mineral concentration of the water is increasing.

FLY ASH: The noncombustible particles in flue gas. Often used as a body feed or solidification chemical.

FOLLICLE STIMULATING HORMONE (FSH): A gonadotropic hormone of the anterior pituitary that stimulates growth of follicles in the ovaries of females and function of the seminiferous tubules in males.

FOLLICLE: A jacket of cells around an egg cell in an ovary.

FOOD CHAIN: Sequence of organisms, including producers, consumers, and decomposers, through which energy and materials may move in a community.

FOOD WEB: The elaborate, interconnected feeding relationships in an ecosystem.

FORMAZIN TURBIDITY UNIT (FTU): A unit used to measure the clarity of water. The ISO refers to the units as FNU (Formazin Nephelometric Units). The technique is the same as that for the NTU, but the calibration uses microspheres of the polymer formazin.

FORMULA: A precise representation of the structure of a molecule or ion, showing the proportion of atoms which comprise the material.

FOUNDER EFFECT: The difference between the gene pool of a population as a whole and that of a newly isolated population of the same species.

FRACTIONATION: An experimental technique that involves separation of parts of living tissue from one another using centrifugation.

FRAGMENTATION: A mechanism of asexual reproduction in which the parent plant or animal separates into parts that reform whole organisms.

FREE CHLORINE RESIDUAL: Regardless of whether pre-chloration is practiced or not, a free chlorine residual of at least 1.0 mg/L should be maintained in the clear well or distribution reservoir immediately downstream from the point of post-chlorination. The reason for chlorinating past the breakpoint is to provide protection in case of backflow.

FREE CHLORINE: In disinfection, chlorine is used in the form of free chlorine or as hypochlorite ion.

FREE OIL: Non-emulsified oil that separates from water, in a given period of time.

FREQUENCY DEPENDENT SELECTION: A decline in the reproductive success of a morph resulting from the morph's phenotype becoming too common in a population; a cause of balanced polymorphism in populations.

FUNCTIONAL GROUP: One of several groups of atoms commonly found in organic molecules. A functional group contributes somewhat predictable properties to the molecules that possess them.
FUNDAMENTAL NICHE: The total resources an organism is theoretically capable of utilizing.

G

G: (protein) A membrane protein that serves as an intermediary between hormone receptors and the enzyme adenylate cyclase, which converts ATP to cAMP in the second messenger system in non-steroid hormone action. Depending on the system, G proteins either increase or decrease cAMP production.
G1 PHASE: The first growth phase of the cell cycle, consisting of the portion of interphase before DNA synthesis is initiated.
G2 PHASE: The second growth phase of the cell cycle, consisting of the portion of interphase after DNA synthesis but before mitosis.
GAMETANGIUM: The reproductive organ of bryophytes, consisting of the male antheridium and female archegonium; a multi-chambered jacket of sterile cells in which gametes are formed.
GAMETE: A sexual reproductive cell that must usually fuse with another such cell before development begins; an egg or sperm.
GAMETOPHYTE: A haploid plant that can produce gametes.
GANGLION: A structure containing a group of cell bodies of neurons.
GAP JUNCTION: A narrow gap between plasma membranes of two animal cells, spanned by protein channels. They allow chemical substances or electrical signals to pass from cell to cell.
GASTRULATION: The process by which a blastula develops into a gastrula, usually by an involution of cells.
GATED ION CHANNEL: A membrane channel that can open or close in response to a signal, generally a change in the electrostatic gradient or the binding of a hormone, transmitter, or other molecular signal.
GEL ELECTROPHORESIS: In general, electrophoresis is a laboratory technique used to separate macromolecules on the basis of electric charge and size; the technique involves application of an electric field to a population of macromolecules which disperse according to their electric mobilities. In gel electrophoresis, the porous medium through which the macromolecules move is a gel.
GEL: Colloid in which the suspended particles form a relatively orderly arrangement.
GENE AMPLIFICATION: Any of the strategies that give rise to multiple copies of certain genes, thus facilitating the rapid synthesis of a product (such as rRna for ribosomes) for which the demand is great.
GENE CLONING: Formation by a bacterium, carrying foreign genes in a recombinant plasmid, of a clone of identical cells containing the replicated foreign genes.
GENE DELIVERY: This is a general term for the introduction of new genetic elements into the genomes of living cells. The delivery problem is essentially conditioned by the fact that the new genetic elements are usually large, and by the presence of the outer cell membrane and the nuclear membrane acting as barriers to incorporation of the new DNA into the genome already present in the nucleus. Viruses possess various natural biochemical methods for achieving gene delivery; artificial gene delivery is one of the essential problems of "genetic engineering". The most important barrier is apparently the outer cell membrane, which is essentially a lipid barrier, and introduction of any large complex into the cell requires a fusion of one kind or another with this membrane. Liposomes, which consist of lipid membranes themselves, and which can fuse with outer cell membranes, are thus potential vehicles for delivery of many substances, including DNA.
GENE FLOW: The movement of genes from one part of a population to another, or from one population to another, via gametes.
GENE POOL: The sum total of all the genes of all the individuals in a population.
GENE REGULATION: Any of the strategies by which the rate of expression of a gene can be regulated, as by controlling the rate of transcription.
GENE: The hereditary determinant of a specified characteristic of an individual; specific sequences of nucleotides in DNA.
GENETIC DRIFT: Change in the gene pool as a result of chance and not as a result of selection, mutation, or migration.
GENETIC RECOMBINATION: The general term for the production of offspring that combine traits of the two parents.
GENETICS: The science of heredity; the study of heritable information.
GENOME: The cell's total complement of DNA.
GENOMIC EQUIVALENCE: The presence of all of an organism's genes in all of its cells.
GENOMIC IMPRINTING: The parental effect on gene expression. Identical alleles may have different effects on offspring depending on whether they arrive in the zygote via the ovum or via the sperm.
GENOMIC LIBRARY: A set of thousands of DNA segments from a genome, each carried by a plasmid or phage.
GENOTYPE: The particular combination of genes present in the cells of an individual.
GENUS: A taxonomic category above the species level, designated by the first word of a species' binomial Latin name.

GIARDIA LAMBLIA: Giardia lamblia (synonymous with Lamblia intestinalis and Giardia duodenalis) is a flagellated protozoan parasite that colonizes and reproduces in the small intestine, causing giardiasis. The giardia parasite attaches to the epithelium by a ventral adhesive disc, and reproduces via binary fission. Giardiasis does not spread via the bloodstream, nor does it spread to other parts of the gastro-intestinal tract, but remains confined to the lumen of the small intestine. Giardia trophozoites absorb their nutrients from the lumen of the small intestine, and are anaerobes.
GIARDIA LAMBLIA*:* A parasite that enters lakes and rivers through sewage and animal waste. It causes gastrointestinal illness (e.g. diarrhea, vomiting, cramps).
GIS – GRAPHIC INFORMATION SYSTEM: Detailed information about the physical locations of structures such as pipes, valves, and manholes within geographic areas with the use of satellites.
GLIAL CELL: A non-conducting cell of the nervous system that provides support, insulation, and protection for the neurons.
GLIDING: Rod-shaped, gram-negative, mostly aerobic; glide on secreted slimy substances; form colonies, frequently with complex fruiting structures.
GLOMERULUS: A capillary bed within Bowman's capsule of the nephron; the site of ultrafiltration.
GLUCOSE: A six-carbon sugar which plays a central role in cellular metabolism.
GLYCOCALYX: The layer of protein and carbohydrates just outside the plasma membrane of an animal cell; in general, the proteins are anchored in the membrane, and the carbohydrates are bound to the proteins.
GLYCOGEN: A long, branched polymer of glucose subunits that is stored in the muscles and liver of animals and is metabolized as a source of energy.
GLYCOLYSIS: A metabolic pathway which occurs in the cytoplasm of cells and during which glucose is oxidized anaerobically to form pyruvic acid.
GLYCOPROTEIN: A protein with covalently linked sugar residues. The sugars may be bound to OH side chains of the polypeptide (O: linked) or the amide nitrogen of asparagine side chains (N: linked).
GLYCOSIDIC: A type of bond which links monosaccharide subunits together in di- or polysaccharides.
GLYOXYSOME: A type of microbody found in plants, in which stored lipids are converted to carbohydrates.
GOLGI APPARATUS: A system of concentrically folded membranes found in the cytoplasm of eukaryotic cells. Plays a role in the production and release of secretory materials such as the digestive enzymes manufactured in the pancreas.
GONADOTROPIN: Refers to a member of a group of hormones capable of promoting growth and function of the gonads. Includes hormones such as follicle stimulating hormone (FSH) and luteinizing hormone (LH) which are stimulatory to the gonads.
GOOD CONTACT TIME, pH and LOW TURBIDITY: These are factors that are important in providing good disinfection when using chlorine.
GPM: Gallons per minute.
GRAB SAMPLE: A sample that is taken from a water or wastestream on a one-time basis with no regard to the flow of the water or wastestream and without consideration of time. A single grab sample should be taken over a period of time not to exceed 15 minutes. A single water or wastewater sample taken at a time and place representative of total discharge.
GRADED POTENTIAL: A local voltage change in a neuron membrane induced by stimulation of a neuron, with strength proportional to the strength of the stimulus and lasting about a millisecond.
GRANUM: A stack-like grouping of photosynthetic membranes in a chloroplast
GRAVITY BELT THICKENER: A sludge dewatering device utilizing a filter belt to promote gravity drainage of water. Usually precedes additional dewatering treatment.
GRAVITY FILTER: A filter that operates at atmospheric pressure.
GRAVITY THICKENING: A sedimentation basin designed to operate at high solids loading rates.
GROWTH FACTOR: A protein that must be present in a cell's environment for its normal growth and development.
GT: Represents (Detention time) x (mixing intensity) in flocculation.
GYMNOSPERM: A vascular plant that bears naked seeds not enclosed in any specialized chambers.

H

H2SO4: The molecular formula of Sulfuric acid.
HABIT: In biology, the characteristic form or mode of growth of an organism.
HABITAT: The kind of place where a given organism normally lives.
HABITUATION: The process that results in a long-lasting decline in the receptiveness of interneurons to the input from sensory neurons or other interneurons (sensitization, adaptation).
HALIDES: A halide is a binary compound, of which one part is a halogen atom and the other part is an element or radical that is less electronegative than the halogen, to make a fluoride, chloride, bromide, iodide, or astatide compound. Many salts are halides. All Group 1 metals form halides with the halogens and they are white solids. A halide ion is a halogen atom bearing a negative charge. The halide anions are fluoride (F), chloride (Cl), bromide (Br), iodide (I) and astatide (At). Such ions are present in all ionic halide salts.

HALOACETIC ACIDS: Haloacetic acids are carboxylic acids in which a halogen atom takes the place of a hydrogen atom in acetic acid. Thus, in a monohaloacetic acid, a single halogen would replace a hydrogen atom. For example, chloroacetic acid would have the structural formula CH_2ClCO_2H. In the same manner, in dichloroacetic acid two chlorine atoms would take the place of two hydrogen atoms ($CHCl_2CO_2H$).

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HAPLOID: The condition of having only one kind of a given type of chromosome.

HARD WATER: Hard water causes a buildup of scale in household hot water heaters. Hard water is a type of water that has high mineral content (in contrast with soft water). Hard water primarily consists of calcium (Ca2+), and magnesium (Mg2+) metal cations, and sometimes other dissolved compounds such as bicarbonates and sulfates. Calcium usually enters the water as either calcium carbonate ($CaCO_3$), in the form of limestone and chalk, or calcium sulfate ($CaSO_4$), in the form of other mineral deposits. The predominant source of magnesium is dolomite ($CaMg(CO_3)2$). Hard water is generally not harmful. The simplest way to determine the hardness of water is the lather/froth test: soap or toothpaste, when agitated, lathers easily in soft water but not in hard water. More exact measurements of hardness can be obtained through a wet titration. The total water 'hardness' (including both Ca2+ and Mg2+ ions) is read as parts per million or weight/volume (mg/L) of calcium carbonate (CaCO3) in the water. Although water hardness usually only measures the total concentrations of calcium and magnesium (the two most prevalent, divalent metal ions), iron, aluminum, and manganese may also be present at elevated levels in some geographical locations.

HARDNESS: A measure of the amount of calcium and magnesium salts in water. More calcium and magnesium lead to greater hardness. The term "hardness" comes from the fact that it is hard to get soapsuds from soap or detergents in hard water. This happens because calcium and magnesium react strongly with negatively charged chemicals like soap to form insoluble compounds.

HAZARDS OF POLYMERS: Slippery and difficult to clean-up are the most common hazards associated with the use of polymers in a water treatment plant.

HEAD: The measure of the pressure of water expressed in feet of height of water. 1 PSI = 2.31 feet of water or 1 foot of head equals about a half a pound of pressure or .433 PSI. There are various types of heads of water depending upon what is being measured. Static (water at rest) and Residual (water at flow conditions).

HEADWORKS: The facility at the "**head**" of the water source where water is first treated and routed into the distribution system.

HEALTH ADVISORY: An EPA document that provides guidance and information on contaminants that can affect human health and that may occur in drinking water, but which the EPA does not currently regulate in drinking water.

HEAT OF VAPORIZATION: The amount of energy absorbed by a substance when it changes state to a gas. Water absorbs approximately 580 calories per gram when it changes from liquid water-to-water vapor.

HEAT: The total amount of kinetic energy due to molecular motion in a body of matter. Heat is energy in its most random form.

HELPER T CELL: A type of T cell that is required by some B cells to help them make antibodies or that helps other T cells respond to antigens or secrete lymphokines or interleukins.

HEMAGGLUTININ: A surface antigen on influenza viruses that controls infectivity by associating with receptors on host erythrocytes or other cells.

HEMATOPOIETIC STEM CELLS: Cells found in the bone marrow of adult mammals which give rise to erythroid stem cells, lymphoid stem cells, and myeloid stem cells. Such cells give rise to erythrocytes and a variety of types of lymphocytes and leucocytes.

HEMOGLOBIN: An iron-containing respiratory pigment found in many organisms.

HEMOLYMPH: In invertebrates with open circulatory systems, the body fluid that bathes tissues.

HEMOPHILIA: A genetic disease resulting from an abnormal sex-linked recessive gene, characterized by excessive bleeding following injury.

HEPATIC: Pertaining to the liver.

HEREDITY: A biological phenomenon whereby characteristics are transmitted from one generation to another by virtue of chemicals (i.e. DNA) transferred during sexual or asexual reproduction.

HERPESVIRUS: A double stranded DNA virus with an enveloped, icosahedral capsid.

HERTZ: The term used to describe the frequency of cycles in an alternating current (AC) circuit. A unit of frequency equal to one cycle per second.

HETEROCHROMATIN: Non-transcribed eukaryotic chromatin that is so highly compacted that it is visible with a light microscope during interphase.

HETEROCHRONY: Evolutionary changes in the timing or rate of development.

HETEROCYST: A specialized cell that engages in nitrogen fixation on some filamentous cyanobacteria.

HETEROGAMY: The condition of producing gametes of two different types (contrast with isogamy).

HETEROMORPHIC: A condition in the life cycle of all modern plants in which the sporophyte and gametophyte generations differ in morphology.
HETEROSPOROUS: Referring to plants in which the sporophyte produces two kinds of spores that develop into unisexual gametophytes, either male or female.
HETEROTROPH: An organism dependent on external sources of organic compounds as a means of obtaining energy and/or materials. Such an organism requires carbon ("food") from its environment in an organic form. (synonym-organotroph).
HETEROTROPHIC PLATE COUNT: A test performed on drinking water to determine the total number of all types of bacteria in the water.
HETEROZYGOTE ADVANTAGE: A mechanism that preserves variation in eukaryotic gene pools by conferring greater reproductive success on heterozygotes over individuals homozygous for any one of the associated alleles.
HETEROZYGOUS: The condition whereby two different alleles of the gene are present within the same cell.
HF: The molecular formula of Hydrofluoric acid.
HIGH TURBIDITY CAUSING INCREASED CHLORINE DEMAND: May occur or be caused by the inadequate disinfection of water.
HIGH-TEST HYPOCHLORITE: A composition composed mainly of calcium hypochlorite is commonly called high test hypochlorite. High-Test Hypochlorite contains not less than 60.0% of available chlorine.
HISTAMINE: A substance released by injured cells that causes blood vessels to dilate during an inflammatory response.
HISTOLOGY: The study of tissues.
HISTONE: A type of protein characteristically associated with the chromosomes of eukaryotes.
HIV-1: Acute human immunodeficiency virus type 1 is the subtype of HIV (human immune deficiency virus) that causes most cases of AIDS in the Western Hemisphere, Europe, and Central, South, and East Africa. HIV is a retrovirus (subclass lentivirus), and retroviruses are single: stranded RNA viruses that have an enzyme called reverse transcriptase. With this enzyme the viral RNA is used as a template to produce viral DNA from cellular material. This DNA is then incorporated into the host cell's genome, where it codes for the synthesis of viral components. An HIV-1 infection should be distinguished from AIDS. Acquired immunodeficiency syndrome (AIDS) is a secondary immunodeficiency syndrome resulting from HIV infection and characterized by opportunistic infections, malignancies, neurologic dysfunction, and a variety of other syndromes.
HOLOBLASTIC: A type of cleavage in which there is complete division of the egg, as in eggs having little yolk (sea urchin) or a moderate amount of yolk (frog).
HOME RANGE: An area within which an animal tends to confine all or nearly all its activities for a long period of time.
HOMEOBOX: Specific sequences of DNA that regulate patterns of differentiation during development of an organism.
HOMEOSTASIS: A phenomenon whereby a state or process (for example, within an organism) is regulated automatically despite the tendency for fluctuations to occur.
HOMEOTHEMIC: Capable of regulation of constancy with respect to temperature.
HOMEOTIC GENES: Genes that control the overall body plan of animals by controlling the developmental fate of groups of cells.
HOMEOTIC: (mutation) A mutation in genes regulated by positional information that results in the abnormal substitution of one type of body part in place of another.
HOMOLOGOUS CHROMOSOMES: Chromosomes bearing genes for the same characters.
HOMOLOGOUS STRUCTURES: Characters in different species that were inherited from a common ancestor and thus share a similar ontogenetic pattern.
HOMOLOGY: Similarity in characteristics resulting from a shared ancestry.
HOMOPLASY: The presence in several species of a trait not present in their most common ancestor. Can result from convergent evolution, reverse evolution, or parallel evolution.
HOMOSPOROUS: Referring to plants in which a single type of spore develops into a bisexual gametophyte having both male and female sex organs.
HOMOZYGOUS: Having two copies of the same allele of a given gene.
HORMONE: A control chemical secreted in one part of the body that affects other parts of the body.
HOST RANGE: The limited number of host species, tissues, or cells that a parasite (including viruses and bacteria) can infect.
HUMORAL IMMUNITY: The type of immunity that fights bacteria and viruses in body fluids with antibodies that circulate in blood plasma and lymph, fluids formerly called humors.
HYBIRD VIGOR: Increased vitality (compared to that of either parent stock) in the hybrid offspring of two different, inbred parents.
HYBIRD: In evolutionary biology, a cross between two species. In genetics, a cross between two genetic types.

HYBIRDIZATION: The process whereby a hybrid results from interbreeding two species; 2) DNA hybridization is the comparison of whole genomes of two species by estimating the extent of hydrogen bonding that occurs between single-stranded DNA obtained from the two species.
HYBRIDOMA: A hybrid cell that produces monoclonal antibodies in culture, formed by the fusion of a myeloma cell with a normal antibody-producing lymphocyte.
HYDRATED LIME: The calcium hydroxide product that results from mixing quicklime with water. Chemical formula is CaOH2.
HYDRATION SHELL: A "covering" of water molecules which surrounds polar or charged substances in aqueous solutions. The association is due to the charged regions of the polar water molecules themselves.
HYDRIDES: Hydride is the name given to the negative ion of hydrogen, H. Although this ion does not exist except in extraordinary conditions, the term hydride is widely applied to describe compounds of hydrogen with other elements, particularly those of groups 1–16. The variety of compounds formed by hydrogen is vast, arguably greater than that of any other element. Various metal hydrides are currently being studied for use as a means of hydrogen storage in fuel cell-powered electric cars and batteries. They also have important uses in organic chemistry as powerful reducing agents, and many promising uses in hydrogen economy.
HYDROCARBON: Any compound made of only carbon and hydrogen.
HYDROCHLORIC ACID: It is the aqueous solution of hydrogen chloride gas (HCl). It is a strong acid, and the major component of gastric acid, and of wide industrial use. Hydrochloric acid must be handled with appropriate safety precautions because it is a highly corrosive liquid.
HYDROCHLORIC AND HYPOCHLOROUS ACIDS: The compounds that are formed in water when chlorine gas is introduced.
HYDROFLUOSILICIC ACID: (H_2SiF_6) a clear, fuming corrosive liquid with a pH ranging from 1 to 1.5. Used in water treatment to fluoridate drinking water.
HYDROGEN BOND: A type of bond formed when the partially positive hydrogen atom of a polar covalent bond in one molecule is attracted to the partially negative atom of a polar covalent bond in another.
HYDROGEN ION: A single proton with a charge of +1. The dissociation of a water molecule (H2O) leads to the generation of a hydroxide ion (OH-) and a hydrogen ion (H+).
HYDROGEN SULFIDE: A toxic gas formed by the anaerobic decomposition of organic matter. Chemical formula is H2S.
HYDROLYSIS: The chemical reaction that breaks a covalent bond through the addition of hydrogen (from a water molecule) to the atom forming one side of the original bond, and a hydroxyl group to the atom on the other side.
HYDROPHILIC: Having an affinity for water.
HYDROPHOBIC INTERACTION: A type of weak chemical bond formed when molecules that do not mix with water coalesce to exclude the water.
HYDROPHOBIC: The physicochemical property whereby a substance or region of a molecule resists association with water molecules.
HYDROSTATIC: Pertaining to the pressure and equilibrium of fluids. A hydrostatic skeleton is a skeletal system composed of fluid held under pressure in a closed body compartment; the main skeleton of most cnidarians, flatworms, nematodes, and annelids.
HYDROXYL GROUP: A functional group consisting of a hydrogen atom joined to an oxygen atom by a polar covalent bond. Molecules possessing this group are soluble in water and are called alcohols.
HYDROXYL ION: The OH- ion.
HYPEROSMOTIC: A solution with a greater solute concentration than another, a hypoosmotic solution. If the two solutions are separated from one another by a membrane permeable to water, water would tend to move from the hypo- to the hyperosmotic side.
HYPERPOLARIZATION: An electrical state whereby the inside of the cell is made more negative relative to the outside than was the case at resting potential. A neuron membrane is hyperpolarized if the voltage is increased from the resting potential of about -70 mV, reducing the chance that a nerve impulse will be transmitted.
HYPERTROPHY: Abnormal enlargement, excessive growth.
HYPHA: A fungal filament.
HYPOCHLORITE AND ORGANIC MATERIALS: Heat and possibly fire may occur when hypochlorite is brought into contact with an organic material.
HYPOCOTYL: The portion of the axis of a plant embryo below the point of attachment of the cotyledons; forms the base of the shoot and the root.
HYPOOSMOTIC SOLUTION: A solution with a lesser solute concentration than another, a hyperosmotic solution. If the two solutions are separated from one another by a membrane permeable to water, water would tend to move from the hypo- to the hyperosmotic side.
HYPOTHESIS: A formal statement of supposition offered to explain observations. Note that a hypothesis is only useful if it can be tested. Even if correct, it is not scientifically useful if untestable.

HYPOTHETICO-DEDUCTIVE: A method used to test hypotheses. If deductions formulated from the hypothesis are tested and proven false, the hypothesis is rejected.

If the actual pH of the water is below the calculated saturation pH, the LSI is negative and the water has a very limited scaling potential. If the actual pH exceeds pHs, the LSI is positive, and being supersaturated with CaCO3, the water has a tendency to form scale. At increasing positive index values, the scaling potential increases.

I

IMAGINAL DISK: An island of undifferentiated cells in an insect larva, which are committed (determined) to form a particular organ during metamorphosis to the adult.

IMBIBITION: The soaking of water into a porous material that is hydrophilic.

IMMUNE RESPONSE: 1) A primary immune response is the initial response to an antigen, which appears after a lag of a few days. 2) A secondary immune response is the response elicited when the animal encounters the same antigen at a later time. The secondary response is normally more rapid, of greater magnitude and of longer duration than the primary response.

IMMUNOGLOBULINE: The class of proteins comprising the antibodies.

IMMUNOLOGICAL: 1) Immunological distance is the amount of difference between two proteins as measured by the strength of the antigen: antibody reaction between them. 2) Immunological tolerance is a mechanism by which an animal does not mount an immune response to the antigenic determinants of its own macromolecules.

IMMUNOMAGNETIC SEPARATION (IMS): A purification procedure that uses microscopic, magnetically responsive particles coated with an antibodies targeted to react with a specific pathogen in a fluid stream. Pathogens are selectively removed from other debris using a magnetic field.

IMPELLERS: The semi-open or closed props or blades of a turbine pump that when rotated generate the pumping force.

IMPERVIOUS: Not allowing, or allowing only with great difficulty, the movement of water.

IMPRINTING: A type of learned behavior with a significant innate component, acquired during a limited critical period.

IN SERIES: Several components being connected one to the other without a bypass, requiring each component to work dependent on the one before it.

IN SITU: Treatment or disposal methods that do not require movement of contaminated material.

INCINERATION: The process of reducing the volume of a material by burning and reducing to ash if possible.

INCLINED PLATE SEPARATOR: A series of parallel inclined plates that can be used to increase the efficiency of clarifiers and gravity thickeners.

INCOMPLETE DOMINANCE: A type of inheritance in which F1 hybrids have an appearance that is intermediate between the phenotypes of the parental varieties.

INDETERMINATE: 1) A type of cleavage exhibited during the embryonic development in deuterostomes, in which each cell produced by early cleavage divisions retains the capacity to develop into a complete embryo; 2) A type of growth exhibited by plants: they continue to grow as long as they live, because they always retain meristematic cells capable of undergoing mitosis.

INDIRECT REUSE: The beneficial use of reclaimed water into natural surface waters or groundwater.

INDUCED FIT: The change in shape of the active site of an enzyme so that it binds more snugly to the substrate, induced by entry of the substrate.

INDUCTION: 1) The ability of one group of embryonic cells to influence the development of another. 2) A method in logic that proceeds from the specific to general and develops a general statement which explains all of the observations. Commonly used to formulate scientific hypotheses.

INDUSTRIAL WASTEWATER: Liquid wastes resulting from industrial processes.

INFECTIOUS PATHOGENS/MICROBES/GERMS: Are considered disease-producing bacteria, viruses and other microorganisms.

INFECTIOUS: 1) An infectious disease is a disease caused by an infectious microbial or parasitic agent. 2) Infectious hepatitis is the former name for hepatitis A. 3) Infectious mononucleosis is an acute disease that affects many systems, caused by the Epstein: Barr virus.

INFLAMMATORY RESPONSE: A line of defense triggered by penetration of the skin or mucous membranes, in which small blood vessels in the vicinity of an injury dilate and become leakier, enhancing infiltration of leukocytes; may also be widespread in the body.

INFLUENT: Water or wastewater flowing into a basin or treatment plant.

INFORMATION COLLECTION RULE (ICR): EPA collected data required by the Information Collection Rule (May 14, 1996) to support future regulation of microbial contaminants, disinfectants, and disinfection byproducts. The rule was intended to provide EPA with information on chemical byproducts that form when disinfectants used for microbial control react with chemicals already present in source water (disinfection byproducts (DBPs)); disease-causing microorganisms (pathogens), including Cryptosporidium; and engineering data to control these contaminants.

INGESTION: A heterotrophic mode of nutrition in which other organisms or detritus are eaten whole or in pieces.
INHIBITORY POSTSYNAPTIC POTENTIAL: An electrical charge (hyperpolarization) in the membrane of a postsynaptic neuron caused by the binding of an inhibitory neurotransmitter from a presynaptic cell to a postsynaptic receptor.
INITIAL PRECISION AND RECOVERY (IPR): Four aliquots of spiking suspension analyzed to establish the ability to generate acceptable precision and accuracy. An IPR is performed prior to the first time this method is used and any time the method or instrumentation is modified.
INNER CELL MASS: A cluster of cells in a mammalian blastocyst that protrudes into one end of the cavity and subsequently develops into the embryo proper and some of the extraembryonic membranes.
INORGANIC COMPOUND: Compounds that contain no carbon or contain only carbon bound to elements other than hydrogen.
INORGANIC CONTAMINANTS: Mineral-based compounds such as metals, nitrates, and asbestos. These contaminants are naturally occurring in some water, but can also get into water through farming, chemical manufacturing, and other human activities. EPA has set legal limits on 15 inorganic contaminants.
INORGANIC IONS: Present in all waters. Inorganic ions are essential for human health in small quantities, but in larger quantities they can cause unpleasant taste and odor or even illness. Most community water systems will commonly test for the concentrations of seven inorganic ions: nitrate, nitrite, fluoride, phosphate, sulfate, chloride, and bromide. Nitrate and nitrite can cause an illness in infants called methemoglobinemia. Fluoride is actually added to the drinking water in some public water systems to promote dental health. Phosphate, sulfate, chloride, and bromide have little direct effect on health, but high concentrations of inorganic ions can give water a salty or briny taste.
INSERTION: A mutation involving the addition of one or more nucleotide pairs to a gene.
INSOLUBLE COMPOUNDS: Are types of compounds cannot be dissolved. When iron or manganese reacts with dissolved oxygen (**DO**) insoluble compound are formed.
INSULIN: The vertebrate hormone that lowers blood sugar levels by promoting the uptake of glucose by most body cells and promoting the synthesis and storage of glycogen in the liver; also stimulates protein and fat synthesis; secreted by endocrine cells of the pancreas called islets of Langerhans.
INTAKE FACILITIES: One of the more important considerations in the construction of intake facilities is the ease of operation and maintenance over the expected lifetime of the facility. Every intake structure must be constructed with consideration for operator
INTEGRAL PROTEIN: A protein of biological membranes that penetrates into or spans the membrane.
INTERBREED: To breed with another kind or species; hybridize.
INTERFERON: A chemical messenger of the immune system, produced by virus: infected cells and capable of helping other cells resist the virus.
INTERLEUKIN: 1: A chemical regulator (cytokine) secreted by macrophages that have ingested a pathogen or foreign molecule and have bound with a helper T cell; stimulates T cells to grow and divide and elevates body temperature. Interleukin: 2, secreted by activated T cells, stimulates helper T cells to proliferate more rapidly.
INTERTIDAL ZONE: The shallow zone of the ocean where land meets water.
INTRON: The noncoding, intervening sequence of coding region (exon) in eukaryotic genes.
INVAGINATION: The buckling inward of a cell layer, caused by rearrangements of microfilaments and microtubules; an important phenomenon in embryonic development.
INVERSION: 1) An aberration in chromosome structure resulting from an error in meiosis or from mutagens; reattachment in a reverse orientation of a chromosomal fragment to the chromosome from which the fragment originated. 2) A phenomenon that occurs during early development of sponges at which time the external ciliated cells become inward-directed.
INVERTEBRATE: An animal without a backbone; invertebrates make up about 95% of animal species.
ION EXCHANGE: An effective treatment process used to remove iron and manganese in a water supply. The hardness of the source water affects the amount of water an ion exchange softener may treat before the bed requires regeneration.
ION: A charged chemical formed when an atom or group of atoms has more or less electrons than protons (rather than an equal number).
IONIC BOND: A chemical bond due to attraction between oppositely charged ions.
IRON AND MANGANESE: In water, they can usually be detected by observing the color of the inside walls of filters and the filter media. If the raw water is pre-chlorinated, there will be black stains on the walls below the water level and a black coating over the top portion of the sand filter bed. When significant levels of dissolved oxygen are present, iron and manganese exist in an oxidized state and normally precipitate into the reservoir bottom sediments. The presence of iron and manganese in water promote the growth of Iron bacteria. Only when a water sample has been acidified then you can perform the analysis beyond the 48-hour holding time. Iron and Manganese in water may be detected by observing the color of the of the filter

media. Maintaining a free chlorine residual and regular flushing of water mains may control the growth of iron bacteria in a water distribution system.

IRON BACTERIA: In the management of water-supply wells, iron bacteria are bacteria that derive the energy they need to live and multiply by oxidizing dissolved ferrous iron (or the less frequently available manganese and aluminum). The resulting ferric oxide is insoluble, and appears as brown gelatinous slime that will stain plumbing fixtures, and clothing or utensils washed with the water carrying it, and may contribute to internal corrosion of the pipes and fixtures the water flows through. They are known to grow and proliferate in waters containing as low as 0.1mg/l of iron. However, at least 0.3 ppm of dissolved oxygen is needed to carry out oxidation. The proliferation of iron bacteria, in some way, increases the chance of sulfur bacteria infestation.

IRON: The elements iron and manganese are undesirable in water because they cause stains and promote the growth of iron bacteria.

ISOMER: Molecules consisting of the same numbers and kinds of atoms, but differing in the way in which the atoms are combined.

ISOSMOTIC: Solutions of equal concentration with respect to osmotic pressure.

ISOTOPE: An atomic form of an element, containing a different number of neutrons than another isotope. Isotopes vary from one another with respect to atomic mass.

K

K- SELECTION: The concept that life history of the population is centered upon producing relatively few offspring that have a good chance of survival.

KARYOGAMY: The fusion of nuclei of two cells, as part of syngamy.

KARYOTYPE: A method of classifying the chromosomes of a cell in relation to number, size and type.

KEYSTONE PREDATOR: A species that maintains species richness in a community through predation of the best competitors in the community, thereby maintaining populations of less competitive species.

KILL = C X T: Where other factors are constant, the disinfecting action may be represented by: Kill=C x T.

KILOCALORIE: A thousand calories; the amount of heat energy required to raise the temperature of 1 kilogram of water by primary C.

KINGDOM: A taxonomic category, the second broadest after domain.

L

L.O.T.O.: If a piece of equipment is locked out, the key to the lock-out device the key should be held by the person who is working on the equipment. The tag is an identification device and the lock is a physical restraint.

LABORATORY BLANK: See Method blank

LABORATORY CONTROL SAMPLE (LCS): See Ongoing precision and recovery (OPR) standard

LAND APPLICATION: The disposal of wastewater or municipal solids onto land under controlled conditions.

LAND DISPOSAL: Application of municipal wastewater solids to the soil without production of usable agricultural products.

LANDFILL: A land disposal site that employs an engineering method of solid waste disposal to minimize environmental hazards and protect the quality of surface and subsurface waters.

LANGELIER INDEX: A measurement of Corrosivity. The water is becoming corrosive in the distribution system causing rusty water if the Langelier index indicates that the pH has decreased from the equilibrium point. Mathematically derived factor obtained from the values of calcium hardness, total alkalinity, and pH at a given temperature. A Langelier index of zero indicates perfect water balance (i.e., neither corroding nor scaling). The Langelier Saturation Index (sometimes Langelier Stability Index) is a calculated number used to predict the calcium carbonate stability of water. It indicates whether the water will precipitate, dissolve, or be in equilibrium with calcium carbonate. Langelier developed a method for predicting the pH at which water is saturated in calcium carbonate (called pHs). The LSI is expressed as the difference between the actual system pH and the saturation pH.

LARVA (pl. larvae): A free-living, sexually immature form in some animal life cycles that may differ from the adult in morphology, nutrition, and habitat.

LEACHATE: Fluid that trickles through solid materials or wastes and contains suspended or dissolved materials or products of the solids.

LEACHING: A chemical reaction between water and metals that allows for removal of soluble materials.

LEADING STRAND: The new continuously complementary DNA strand synthesized along the template strand in the 5' --- > 3' direction.

LETHAL CONCENTRATION 50: Also referred to as LC50, a concentration of a pollutant or effluent at which 50 percent of the test organisms die; a common measure of acute toxicity.

LEUKOCYTE: A white blood cell; typically functions in immunity, such as phagocytosis or antibody production.

LEVELS OF ORGANIZATION: A basic concept in biology is that organization is based on a hierarchy of structural levels, with each level building on the levels below it.

LICHEN: An organism formed by the symbiotic association between a fungus and a photosynthetic alga.

LIFE: A table of data summarizing mortality in a population.
LIGAMENT: A type of fibrous connective tissue that joins bones together at joints.
LIGAND: A ligand is a molecule that binds specifically to a receptor site of another molecule. A ligase is an enzyme that catalyzes such a reaction. For example, a DNA ligase is an enzyme that catalyzes the covalent bonding of the 3' end of a new DNA fragment to the 5' end of a growing chain.
LIGASE: Ligases are enzymes that catalyze the "stitching together" of polymer fragments. DNA ligase, for example, catalyzes phosphodiester bond formation between two DNA fragments, and this enzyme is involved in normal DNA replication, repair of damaged chromosomes, and various in vitro techniques in genetic engineering that involve linking DNA fragments.
LIGNIN: A hard material embedded in the cellulose matrix of vascular plant cell walls that functions as an important adaptation for support in terrestrial species.
LIMBIC SYSTEM: A group of nuclei (clusters of nerve cell bodies) in the lower part of the mammalian forebrain that interact with the cerebral cortex in determining emotions; includes the hippocampus and the amygdala.
LIME SOFTENING: Lime softening is primarily used to “soften” water—that is to remove calcium and magnesium mineral salts. But it also removes harmful toxins like radon and arsenic. Though there is no consensus, some studies have even suggested that lime softening is effective at removal of Giardia. Hard water is a common condition responsible for numerous problems. Users often recognize hard water because it prevents their soap from lathering properly. However, it can also cause buildup (“scale”) in hot water heaters, boilers, and hot water pipes. Because of these inconveniences, many treatment facilities use lime softening to soften hard water for consumer use. Before lime softening can be used, managers must determine the softening chemistry required. This is a relatively easy task for groundwater sources, which remain more constant in their composition. Surface waters, however, fluctuate widely in quality and may require frequent changes to the softening chemical mix. In lime softening, lime and sometimes sodium carbonate are added to the water as it enters a combination solids contact clarifier. This raises the pH (i.e., increases alkalinity) and leads to the precipitation of calcium carbonate. Later, the pH of the effluent from the clarifier is reduced again, and the water is then filtered through a granular media filter. The water chemistry requirements of these systems require knowledgeable operators, which may make lime softening an economic challenge for some very small systems.
LIME STABILIZATION: The addition of lime to untreated sludge to raise the pH to 12 for a minimum of 2 hours to chemically inactivate microorganisms.
LIME: The term generally used to describe ground limestone (calcium carbonate), hydrated lime (calcium hydroxide), or burned lime (calcium oxide).
LINKED GENES: Genes that are located on the same chromosomes.
LIPID: One of a family of compounds, including fats, phospholipids, and steroids, that are insoluble in water.
LIPOSOME: Liposomes are vesicles (spherules) in which the lipid molecules are spontaneously arranged into bilayers with hydrophilic groups exposed to water molecules both outside the vesicle and in the core.
LISTED HAZARDOUS WASTE: The designation for a waste material that appears on an EPA list of specific hazardous wastes or hazardous waste categories.
LOCUS: A particular place along the length of a certain chromosome where a specified allele is located.
LOGISTIC POPULATION GROWTH: A model describing population growth that levels off as population size approaches carrying capacity.
LSI = pH - pHs
LYSOGENIC CYCLE: A type of viral replication cycle in which the viral genome becomes incorporated into the bacterial host chromosome as a prophage.
LYTIC CYCLE: A type of viral replication cycle resulting in the release of new phages by death or lysis of the host cell.

M

M PHASE: The mitotic phase of the cell cycle, which includes mitosis and cytokinesis.
M.S.D.S.: Now S.D.S. (Safety Data Sheet) .A safety document must an employer provide to an operator upon request.
MACROMOLECULE: A giant molecule of living matter formed by the joining of smaller molecules, usually by condensation synthesis. Polysaccharides, proteins, and nucleic acids are macromolecules.
MACROPHAGE: An amoeboid cell that moves through tissue fibers, engulfing bacteria and dead cells by phagocytosis.
MAGNESIUM HARDNESS: Measure of the magnesium salts dissolved in water – it is not a factor in water balance.
MAGNETIC STARTER: Is a type of motor starter should be used in an integrated circuit to control flow automatically.

MAJOR HISTOCOMPATIBILITY COMPLEX: A large set of cell surface antigens encoded by a family of genes. Foreign MHC markers trigger T-cell responses that may lead to rejection of transplanted tissues and organs.
MAKEUP WATER: Fluid introduced in a recirculating stream to maintain an equilibrium of temperature, solids concentration or other parameters. Also refers to the quantity of water required to make a solution.
MALPHIGHIAN TUBULE: A unique excretory organ of insects that empties into the digestive tract, removes nitrogenous wastes from the blood, and functions in osmoregulation.
MANGANESE (IV) OXIDE: The chemical compound MnO2, commonly called manganese dioxide. This blackish or brown solid occurs naturally as the mineral pyrolusite, which is the main ore of manganese. It is also present in manganese nodules. The principal use for MnO2 is for dry-cell batteries, such as the alkaline battery and the zinc-carbon battery. In 1976 this application accounted for 500,000 tons of pyrolusite. MnO2 is also used for production of MnO4–. It is used extensively as an oxidizing agent in organic synthesis, for example, for the oxidation of allylic alcohols.
MANTLE: A heavy fold of tissue in mollusks that drapes over the visceral mass and may secrete a shell.
MARBLE AND LANGELIER TESTS: Are used to measure or determine the corrosiveness of a water source.
MASS NUMBER: The sum of the number of protons plus the number of neutrons in the nucleus of an atom; unique for each element and designated by a superscript to the left of the elemental symbol.
MATRIX SPIKE (MS): A sample prepared by adding a known quantity of organisms to a specified amount of sample matrix for which an independent estimate of target analyte concentration is available. A matrix spike is used to determine the effect of the matrix on a method's recovery efficiency.
MATRIX: The nonliving component of connective tissue, consisting of a web of fibers embedded in homogeneous ground substance that may be liquid, jellylike, or solid.
MATTER: Anything that takes up space and has mass.
MAXIMUM CONTAMINANT LEVEL (MCL): The maximum concentration of a chemical that is allowed in public drinking water systems.
MAXIMUM CONTAMINANT LEVEL (MCLs): The maximum allowable level of a contaminant
MAXIMUM CONTAMINANT LEVEL GOAL (MCLG): The maximum level at which a contaminant can exist in drinking water without having an adverse effect on human health.
MECHANICAL SEAL: A mechanical device used to control leakage from the stuffing box of a pump. Usually made of two flat surfaces, one of which rotates on the shaft. The two flat surfaces are of such tolerances as to prevent the passage of water between them. Held in place with spring pressure.
MECHANORECEPTOR: A sensory receptor that detects physical deformations in the body environment associated with pressure, touch, stretch, motion, and sound.
MEDIAN BODIES: Prominent, dark-staining, paired organelles consisting of microtubules and found in the posterior half of *Giardia*. In *G. intestinalis* (from humans), these structures often have a claw-hammer shape, while in *G. muris* (from mice), the median bodies are round.
MEDIUM WATER SYSTEM: More than 3,300 persons and 50,000 or fewer persons.
MEDULLA OBLONGATA: The lowest part of the vertebrate brain; a swelling of the hindbrain dorsal to the anterior spinal cord that controls autonomic, homeostatic functions, including breathing, heart and blood vessel activity, swallowing, digestion, and vomiting.
MEDUSA: The floating, flattened, mouth-down version of the cnidarian body plan. The alternate form is the polyp.
MEGAPASCAL: A unit of pressure equivalent to 10 atmospheres of pressure.
MEGGER: Used to test the insulation resistance on a motor.
MEIOSIS: A two-stage type of cell division in sexually reproducing organisms that results in gametes with half the chromosome number of the original cell.
MEMBRANE POTENTIAL: The charge difference between the cytoplasm and extracellular fluid in all cells, due to the differential distribution of ions. Membrane potential affects the activity of excitable cells and the transmembrane movement of all charged substances.
MEMBRANE: A thin barrier that permits passage of particles of a certain size or of particular physical or chemical properties.
M-ENDO BROTH: The coliform group are used as indicators of fecal pollution in water, for assessing the effectiveness of water treatment and disinfection, and for monitoring water quality. m-Endo Broth is used for selectively isolating coliform bacteria from water and other specimens using the membrane filtration technique. m-Endo Broth is prepared according to the formula of Fifield and Schaufus.1 It is recommended by the American Public Health Association in standard total coliform membrane filtration procedure for testing water, wastewater, and foods.2,3 The US EPA specifies using m-Endo Broth in the total coliform methods for testing water using single-step, two-step, and delayed incubation membrane filtration methods.
MESENTERIES: Membranes that suspend many of the organs of vertebrates inside fluid- filled body cavities.

MESODERM: The middle primary germ layer of an early embryo that develops into the notochord, the lining of the coelom, muscles, skeleton, gonads, kidneys and most of the circulatory system.
MESOSOME: A localized infolding of the plasma membrane of a bacterium.
MESSENGER: (RNA) A type of RNA synthesized from DNA in the genetic material that attaches to ribosomes in the cytoplasm and specifies the primary structure of a protein.
METABOLISM: The sum total of the chemical and physical changes constantly taking place in living substances.
METALLOID: Metalloid is a term used in chemistry when classifying the chemical elements. On the basis of their general physical and chemical properties, nearly every element in the periodic table can be termed either a metal or a nonmetal. A few elements with intermediate properties are, however, referred to as metalloids. (In Greek metallon = metal and eidos = sort)
METAMORPHOSIS: The resurgence of development in an animal larva that transforms it into a sexually mature adult.
METANEPHRIDIUM: A type of excretory tubule in annelid worms that has internal openings called nephrostomes that collect body fluids and external openings called nephridiopores.
METASTASIS: The spread of cancer cells beyond their original site.
METAZOAN: A multicellular animal. Among important distinguishing characteristics of metazoa are cell differentiation and intercellular communication. For certain multicellular colonial entities such as sponges, some biologists prefer the term "parazoa".
METHANE: Methane is a chemical compound with the molecular formula $CH4$. It is the simplest alkane, and the principal component of natural gas. Methane's bond angles are 109.5 degrees. Burning methane in the presence of oxygen produces carbon dioxide and water. The relative abundance of methane and its clean burning process makes it a very attractive fuel. However, because it is a gas at normal temperature and pressure, methane is difficult to transport from its source.
METHOD BLANK: An aliquot of reagent water that is treated exactly as a sample, including exposure to all glassware, equipment, solvents, and procedures that are used with samples. The method blank is used to determine if analytes or interferences are present in the laboratory environment, the reagents, or the apparatus.
Mg/L: Stands for "**milligrams per liter**." A common unit of chemical concentration. It expresses the mass of a chemical that is present in a given volume of water. A milligram (one one-thousandth of a gram) is equivalent to about 18 grains of table salt. A liter is equivalent to about one quart.
MICROBE OR MICROBIAL: Any minute, simple, single-celled form of life, especially one that causes disease.
MICROBIAL CONTAMINANTS: Microscopic organisms present in untreated water that can cause waterborne diseases.
MICROBIOLOGICAL: Is a type of analysis in which a composite sample unacceptable.
MICROBODY: A small organelle, bounded by a single membrane and possessing a granular interior. Peroxisomes and glyoxysomes are types of microbodies.
MICROFILAMENT: Minute fibrous structure generally composed of actin found in the cytoplasm of eukaryotic cells. They play a role in motion within cells.
MICROFILTRATION: A low-pressure membrane filtration process that removes suspended solids and colloids generally larger than 0.1 micron diameter.
MICROORGANISMS: Very small animals and plants that are too small to be seen by the naked eye and must be observed using a microscope. Microorganisms in water include algae, bacteria, viruses, and protozoa. Algae growing in surface waters can cause off-taste and odor by producing the chemicals MIB and geosmin. Certain types of bacteria, viruses, and protozoa can cause disease in humans. Bacteria are the most common microorganisms found in treated drinking water. The great majority of bacteria are not harmful. In fact, humans would not be able to live without the bacteria that inhabit the intestines. However, certain types of bacteria called coliform bacteria can signal the presence of possible drinking water contamination.
MICROSCOPE: An instrument that magnifies images either by using lenses in an optical system to bend light (light microscope) or electromagnets to direct the movement of electrons (electron microscope).
MICROTUBULE: A minute tubular structure found in centrioles, spindle apparati, cilia, flagella, and other places in the cytoplasm of eukaryotic cells. Microtubules play a role in movement and maintenance of shape.
MICROVILLUS: Collectively, fine, fingerlike projections of the epithelial cells in the lumen of the small intestine that increase its surface area.
MILLIGRAMS PER LITER: (mg/L) A common unit of measurement of the concentration of a material in solution.
MILLILITER: One one-thousandth of a liter; A liter is a little more than a quart. A milliliter is about two drops from an eyedropper.

MIMICRY: A phenomenon in which one species benefits by a superficial resemblance to an unrelated species. A predator or species of prey may gain a significant advantage through mimicry.
MISCIBLE: Capable of being mixed together.
MISSENSE: (mutation) The most common type of mutation involving a base- pair substitution within a gene that changes a codon, but the new codon makes sense, in that it still codes for an amino acid.
MITOCHONDRIAL MATRIX: The compartment of the mitochondrion enclosed by the inner membrane and containing enzymes and substrates for the Krebs cycle.
MITOCHONDRION: An organelle that occurs in eukaryotic cells and contains the enzymes of the citric acid cycle, the respiratory chain, and oxidative phosphorylation. A mitochondrion is bounded by a double membrane.
MITOSIS: A process of cell division in eukaryotic cells conventionally divided into the growth period (interphase) and four stages: prophase, metaphase, anaphase, and telophase. The stages conserve chromosome number by equally allocating replicated chromosomes to each of the daughter cells.
MIXED LIQUOR SUSPENDED SOLIDS: Suspended solids in the mixture of wastewater and activated sludge undergoing aeration in the aeration basin.
MODEM SYNTHESIS: A comprehensive theory of evolution emphasizing natural selection, gradualism, and populations as the fundamental units of evolutionary change; also called Neo-Darwinism.
MOISTURE AND POTASSIUM PERMANGANATE: The combination of moisture and potassium permanganate produces heat.
MOISTURE: If a material is hygroscopic, it must it be protected from water.
MOLARITY: A common measure of solute concentration, referring to the number of moles of solute in 1 L of solution.
MOLD: A rapidly growing, asexually reproducing fungus.
MOLE: The number of grams of a substance that equals its molecular weight in daltons and contains Avogadro's number of molecules.
MOLECULAR FORMULA: A type of molecular notation indicating only the quantity of the constituent atoms.
MOLECULAR WEIGHT: The molecular mass (abbreviated Mr) of a substance, formerly also called molecular weight and abbreviated as MW, is the mass of one molecule of that substance, relative to the unified atomic mass unit u (equal to 1/12 the mass of one atom of carbon-12). This is distinct from the relative molecular mass of a molecule, which is the ratio of the mass of that molecule to 1/12 of the mass of carbon 12 and is a dimensionless number. Relative molecular mass is abbreviated to Mr.
MOLECULE: Two or more atoms of one or more elements held together by ionic or covalent chemical bonds.
MOLTING: A process in arthropods in which the exoskeleton is shed at intervals to allow growth by secretion of a larger exoskeleton.
MONERA: The kingdom of life forms that includes all of the bacteria.
MONOMER: A small molecule, two or more of which can be combined to form oligomers (consisting of a few monomers) or polymers (consisting of many monomers).
MONOPHYLETIC: A term used to describe any taxon derived from a single ancestral form that gave rise to no species in other taxa.
MONOSACCHARIDE: A simple sugar; a monomer.
MORPHOGENESIS: The development of body shape and organization during ontogeny.
MORPHOSPECIES: Species defined by their anatomical features.
MOSAIC: A pattern of development, such as that of a mollusk, in which the early blastomeres each give rise to a specific part of the embryo. In some animals, the fate of the blastomeres is established in the zygote.
MOTOR NERVOUS SYSTEM: In vertebrates, the component of the peripheral nervous system that transmits signals from the central nervous system to effector cells.
MPF: M: phase promoting factor: A protein complex required for a cell to progress from late interphase to mitosis; the active form consists of cyclin and cdc2, a protein kinase.
MUD BALLS IN FILTER MEDIA: Is a possible result of an ineffective or inadequate filter backwash.
MULLERIAN MIMICRY: A mutual mimicry by two unpalatable species.
MULTIGENE FAMILY: A collection of genes with similar or identical sequences, presumably of common origin.
MUNICIPAL WASTE: The combined solid and liquid waste from residential, commercial and industrial sources.
MUNICIPAL WASTEWATER TREATMENT PLANT (MWTP): Treatment works designed to treat municipal wastewater.
MURIATIC ACID: An acid used to reduce pH and alkalinity. Also used to remove stain and scale.
MUST: This action, activity, or procedural step is required.
MUTAGEN: A chemical or physical agent that interacts with DNA and causes a mutation.

MUTAGENESIS: The creation of mutations.
MUTATION: A spontaneous or induced change in a gene's or chromosome's structure or number. The resulting individual is termed a mutant.
MUTUALISM: A symbiotic relationship in which both the host and the symbiont benefit.
MYCELIUM: The densely branched network of hyphae in a fungus.
MYCOBACTERIUM: Pleomorphic spherical or rod-shaped, frequently branching, no gram stain, aerobic; commonly form yellow pigments; include Mycobacterium tuberculosis, cause of tuberculosis.
MYCOPLASMA: Spherical, commonly forming branching chains, no gram stain, aerobic but can live in certain anaerobic conditions; without cell walls yet structurally resistant to lysis; among smallest of bacteria; named for superficial resemblance to fungal hyphae (myco-means “fungus’).
MYELIN SHEATH: An insulating coat of cell membrane from Schwann cells that is interrupted by nodes of Ranvier where saltatory conduction occurs.
MYOFIBRILS: Fibrils arranged in longitudinal bundles in muscle cells (fibers); composed of thin filaments of actin and a regulatory protein and thick filaments of myosin.
MYOGLOBIN: An oxygen-storing, pigmented protein in muscle cells.
MYOSIN: A type of protein filament that interacts with actin filaments to cause cell movement, such as contraction in muscle cells.

N

NAD+: Nicatinamide adenine dinucleotide (oxidized); a coenzyme present in all cells that assists enzymes in transferring electrons during the redox reactions of metabolism.
NANO-FILTRATION: A specialty membrane filtration process that rejects solutes larger than approximately one nanometer (10 angstroms) in size.
NANOMETER: A unit of measure (length). 1 nm is equal to 1 x 10: 9 m, or 1/1,000,000 mm.
NaOCl: Is the molecular formula of Sodium hypochlorite.
NaOH: Is the molecular formula of Sodium hydroxide.
NATURAL ORGANIC MATTER: Organic matter present in natural waters.
NEGATIVE CONTROL: See Method blank.
NEGATIVE FEEDBACK: A primary mechanism of homeostasis, whereby a change in a physiological variable that is being monitored triggers a response that counteracts the initial fluctuation.
NEPHELOMETRIC TURBIDITY UNIT (NTU): The unit used to describe turbidity. Nephelometric refers to the way the instrument, a nephelometer, measures how much light is scattered by suspended particles in the water. The greater the scattering, the higher the turbidity. Therefore, low NTU values indicate high water clarity, while high NTU values indicate low water clarity.
NEURON: A nerve cell; the fundamental unit of the nervous system, having structure and properties that allow it to conduct signals by taking advantage of the electrical charge across its cell membrane.
NEUROSECRETORY CELLS: Cells that receive signals from other nerve cells, but instead of signaling to an adjacent nerve cell or muscle, release hormones into the blood stream.
NEUROTRANSMITTER: The chemical messenger released from the synaptic terminals of a neuron at a chemical synapse that diffuses across the synaptic cleft and binds to and stimulates the postsynaptic cell.
NEUTRAL VARIATION: Genetic diversity that confers no apparent selective advantage.
NEUTRALIZATION REACTIONS: Chemical reactions between acids and bases where water is an end product.
NEUTRALIZATION: The chemical process that produces a solution that is neither acidic nor alkaline. Usually with a pH between 6 and 8.
NEUTRON: An uncharged subatomic particle of about the same size and mass as a proton.
NH3: The molecular formula of Ammonia.
NH4+: The molecular formula of the Ammonium ion.
NITRATES: A dissolved form of nitrogen found in fertilizers and sewage by-products that may leach into groundwater and other water sources. Nitrates may also occur naturally in some waters. Over time, nitrates can accumulate in aquifers and contaminate groundwater.
NITROGEN AND PHOSPHORUS: Pairs of elements and major plant nutrients that cause algae to grow.
NITROGEN: Nitrogen is a nonmetal, with an electronegativity of 3.0. It has five electrons in its outer shell and is therefore trivalent in most compounds. The triple bond in molecular nitrogen (N2) is one of the strongest in nature. The resulting difficulty of converting (N_2) into other compounds, and the ease (and associated high-energy release) of converting nitrogen compounds into elemental N2, have dominated the role of nitrogen in both nature and human economic activities. At atmospheric pressure molecular nitrogen condenses (liquefies) at 77 K (-195.8 °C) and freezes at 63 K (-210.0 °C) into the beta hexagonal close-packed crystal allotropic form. Below 35.4 K (-237.6 °C) nitrogen assumes the alpha cubic crystal allotropic form. Liquid nitrogen, a fluid resembling water, but with 80.8% of the density, is a common cryogen. Unstable allotropes of nitrogen consisting of more than two nitrogen atoms have been produced in the laboratory, like N3 and N4.[1] Under extremely high pressures (1.1 million atm) and high temperatures (2000

K), as produced under diamond anvil conditions, nitrogen polymerizes into the single bonded diamond crystal structure, an allotrope nicknamed "nitrogen diamond."
NITROGEN-FIXING: Rod-shaped, gram-negative, aerobic; convert atmospheric nitrogen gas to ammonium in soil; include Azotobacter, a common genus.
NO3-: The molecular formula of the Nitrate ion.
NOMENCLATURE: The method of assigning names in the classification of organisms.
NON-CARBONATE HARDNESS: The portion of the total hardness in excess of the alkalinity.
NON-CARBONATE IONS: Water contains non-carbonate ions if it cannot be softened to a desired level through the use of lime only.
NONCOMPETITIVE INHIBITOR: A substance that reduces the activity of an enzyme by binding to a location remote from the active site, changing its conformation so that it no longer binds to the substrate.
NON-POINT SOURCE POLLUTION: Air pollution may leave contaminants on highway surfaces. This non-point source pollution adversely impacts reservoir water and groundwater quality.
NONPOLAR: Electrically symmetrical. For example, in many molecules with covalent bonds, the electrons are shared equally; the poles are electrically neutral.
NONSENSE MUTATION: A mutation that changes an amino acid codon to one of the three stop codons, resulting in a shorter and usually nonfunctional protein.
NORM OF REACTION: The range of phenotypic possibilities for a single genotpe, as influenced by the environment.
NORMALITY: It is the number of equivalent weights of solute per liter of solution. Normality highlights the chemical nature of salts: in solution, salts dissociate into distinct reactive species (ions such as H+, Fe3+, or Cl-). Normality accounts for any discrepancy between the concentrations of the various ionic species in a solution. For example, in a salt such as MgCl2, there are two moles of Cl- for every mole of Mg2+, so the concentration of Cl- as well as of Mg2+ is said to be 2 N (read: "two normal"). Further examples are given below. A normal is one gram equivalent of a solute per liter of solution. The definition of a gram equivalent varies depending on the type of chemical reaction that is discussed - it can refer to acids, bases, redox species, and ions that will precipitate. It is critical to note that normality measures a single ion which takes part in an overall solute.
NTU: (Nephelometric turbidity unit)**:** A measure of the clarity or cloudiness of water.
NUCLEAR: 1) (envelope) The surface, consisting of two layers of membrane, that encloses the nucleus of eukaryotic cells. 2) (pore) An opening of the nuclear envelope which allows for the movement of materials between the nucleus and surrounding cytoplasm.
NUCLEIC: (acid) A polymer composed of nucleotides that are joined by covalent bonds (phosphodiester linkages) between the phosphate of one nucleotide and the sugar of the next nucleotide.
NUCLELUS: A small, generally spherical body found within the nucleus of eukaryotic cells. The site of ribosomal RNA synthesis.
NUCLEOID: The region that harbors the chromosome of a prokaryotic cell. Unlike the eukaryotic nucleus, it is not bounded by a membrane.
NUCLEOLUS (pl. nucleoli): A specialized structure in the nucleus, formed from various chromosomes and active in the synthesis of ribosomes.
NUCLEOSIDE: An organic molecule consisting of a nitrogenous base joined to a five- carbon sugar.
NUCLEOSOME: The basic, beadlike unit of DNA packaging in eukaryotes, consisting of a segment of DNA wound around a protein core composed of two copies of each of four types of histone.
NUCLEOTIDE: The basic chemical unit (monomer) of a nucleic acid. A nucleotide in RNA consists of one of four nitrogenous bases linked to ribose, which in turn is linked to phosphate. In DNA, deoxyribose is present instead of ribose.
NUCLEUS: A membrane-bound organelle containing genetic material. Nuclei are a prominent internal structure seen both in *Cryptosporidium* oocysts and *Giardia* cysts. In *Cryptosporidium* oocysts, there is one nucleus per sporozoite. One to four nuclei can be seen in *Giardia* cysts.
NUCLEUS: The membrane bound organelle of eukaryotic cells that contains the cell's genetic material. Also the central region of an atom composed of protons and neutrons.
NULL: In the scientific method, the hypothesis which one attempts to falsify.

O

O_3: The molecular formula of ozone.
OLIGOTROPHIC: A reservoir that is nutrient-poor and contains little plant or animal life. An oligotrophic ecosystem or environment is one that offers little to sustain life. The term is commonly utilized to describe bodies of water or soils with very low nutrient levels. It derives etymologically from the Greek oligo (small, little, few) and trophe (nutrients, food). Oligotrophic environments are of special interest for the alternative energy sources and survival strategies upon which life could rely.
ONGOING PRECISION AND RECOVERY (OPR) STANDARD: A method blank spiked with known quantities of analytes. The OPR is analyzed exactly like a sample. Its purpose is to assure that the results produced by the laboratory remain within the limits specified in this method for precision and recovery.

OOCYST: The encysted zygote of some sporozoa; e.g., *Cryptosporidium*. The oocyst is a phase or form of the organism produced as a normal part of the life cycle of the organism. It is characterized by a thick and environmentally resistant outer wall.
ORGANIC MATTER: Substances containing carbon compounds, usually of animal or vegetable origin.
ORGANIC PRECURSORS: Natural or man-made compounds with chemical structures based upon carbon that, upon combination with chlorine, leading to trihalomethane formation.
ORGANIC: Relating to, or derived from, a living thing. A description of a substance that contains carbon atoms linked together by carbon-carbon bonds.
OSMOSIS: Osmosis is the process by which water moves across a semi permeable membrane from a low concentration solute to a high concentration solute to satisfy the pressure differences caused by the solute.
OXIDE: An oxide is a chemical compound containing at least one oxygen atom as well as at least one other element. Most of the Earth's crust consists of oxides. Oxides result when elements are oxidized by oxygen in air. Combustion of hydrocarbons affords the two principal oxides of carbon, carbon monoxide and carbon dioxide. Even materials that are considered to be pure elements often contain a coating of oxides. For example, aluminum foil has a thin skin of Al2O3 that protects the foil from further corrosion. Virtually all elements burn in an atmosphere of oxygen. In the presence of water and oxygen (or simply air), some elements - lithium, sodium, potassium, rubidium, caesium, strontium and barium - react rapidly, even dangerously to give the hydroxides. In part for this reason, alkali and alkaline earth metals are not found in nature in their metallic, i.e., native, form. Caesium is so reactive with oxygen that it is used as a getter in vacuum tubes, and solutions of potassium and sodium, so called NaK are used to deoxygenate and dehydrate some organic solvents. The surface of most metals consists of oxides and hydroxides in the presence of air. A well-known example is aluminum foil, which is coated with a thin film of aluminum oxide that passivates the metal, slowing further corrosion. The aluminum oxide layer can be built to greater thickness by the process of electrolytic anodizing. Although solid magnesium and aluminum react slowly with oxygen at STP, they, like most metals, will burn in air, generating very high temperatures. As a consequence, finely divided powders of most metals can be dangerously explosive in air.
OXIDIZING: The process of breaking down organic wastes into simpler elemental forms or by products. Also used to separate combined chlorine and convert it into free chlorine.
OXYGEN DEFICIENT ENVIRONMENT: One of the most dangerous threats to an operator upon entering a manhole.
OZONE: Ozone or trioxygen (O3) is a triatomic molecule, consisting of three oxygen atoms. It is an allotrope of oxygen that is much less stable than the diatomic O2. Ground-level ozone is an air pollutant with harmful effects on the respiratory systems of animals. Ozone in the upper atmosphere filters potentially damaging ultraviolet light from reaching the Earth's surface. It is present in low concentrations throughout the Earth's atmosphere. It has many industrial and consumer applications. Ozone, the first allotrope of a chemical element to be recognized by science, was proposed as a distinct chemical compound by Christian Friedrich Schönbein in 1840, who named it after the Greek word for smell (ozein), from the peculiar odor in lightning storms. The formula for ozone, O3, was not determined until 1865 by Jacques-Louis Soret and confirmed by Schönbein in 1867.

P

PACKING: Material, usually of woven fiber, placed in rings around the shaft of a pump and used to control the leakage from the stuffing box.
PARAMECIUM: Paramecia are a group of unicellular ciliate protozoa formerly known as slipper animalcules from their slipper shape. They are commonly studied as a representative of the ciliate group. Simple cilia cover the body which allows the cell to move with a synchronous motion (like a caterpilla). There is also a deep oral groove containing inconspicuous compound oral cilia (as found in other peniculids) that is used to draw food inside. They generally feed upon bacteria and other small cells. Osmoregulation is carried out by a pair of contractile vacuoles, which actively expel water absorbed by osmosis from their surroundings. Paramecia are widespread in freshwater environments, and are especially common in scums. Paramecia are attracted by acidic conditions. Certain single-celled eukaryotes, such as Paramecium, are examples for exceptions to the universality of the genetic code (translation systems where a few codons differ from the standard ones).
PARTS PER MILLION (PPM): A common unit of measure used to express the number of parts of a substance contained within a million parts of a liquid, solid, or gas.
PASTEURIZATION: A process for killing pathogenic organisms by applying heat for a specific period of time.
PATHOGENS: Disease-causing pathogens; waterborne pathogens A pathogen may contaminate water and cause waterborne disease.
Pb: The chemical symbol of Lead.
PCE: abbr. perchloroethylene. Known also as perc or tetrachloroethylene, perchloroethylene is a clear, colorless liquid with a distinctive, somewhat ether-like odor. It is non-flammable, having no measurable

flashpoint or flammable limits in air. Effective over a wide range of applications, perchloroethylene is supported by closed loop transfer systems, stabilizers and employee exposure monitoring.
pCi/L: Picocuries per liter A curie is the amount of radiation released by a set amount of a certain compound. A picocurie is one quadrillionth of a curie.
PEAK DEMAND: The maximum momentary load placed on a water treatment plant, pumping station or distribution system.
PERKINESIS: The aggregation resulting from random thermal motion of fluid molecules.
PERMEATE: The term for water which has passed through the membrane of a reverse osmosis unit. The liquid that passes through a membrane.
PERMISSIBLE EXPOSURE LIMIT (PEL or OSHA PEL): A legal limit in the United States for exposure of an employee to a substance or physical agent. For substances it is usually expressed in parts per million (ppm), or sometimes in milligrams per cubic meter (mg/m^3). Units of measure for physical agents such as noise are specific to the agent. Permissible Exposure Limits are established by the Occupational Safety and Health Administration (OSHA).
pH OF SATURATION: The ideal pH for perfect water balance in relation to a particular total alkalinity level and a particular calcium hardness level, at a particular temperature. The pH where the Langelier Index equals zero.
pH: A unit of measure which describes the degree of acidity or alkalinity of a solution. The pH scale runs from 0 to 14 with 7 being the mid-point or neutral. A pH of less than 7 is on the acid side of the scale with 0 as the point of greatest acid activity. A pH of more than 7 is on the basic (alkaline) side of the scale with 14 as the point of greatest basic activity. The term pH is derived from “p”, the mathematical symbol of the negative logarithm, and “H”, the chemical symbol of Hydrogen. The definition of pH is the negative logarithm of the Hydrogen ion activity. $pH=-log[H^+]$.
PHENOL RED: Chemical reagent used for testing pH in the range of 6.8 - 8.4.
PHENOLPHTHALEIN/TOTAL ALKALINITY: The relationship between the alkalinity constituent’s bicarbonate, carbonate, and hydroxide can be based on the P and T alkalinity measurement.
PHOSPHATE, NITRATE AND ORGANIC NITROGEN: Nutrients in a domestic water supply reservoir may cause water quality problems if they occur in moderate or large quantities.
PHYSICAL CHEMICAL TREATMENT: Treatment processes that are non-biological in nature.
PICOCURIE: A unit of radioactivity. "Pico" is a metric prefix that means one one-millionth of one one-millionth. A picocurie is one one-millionth of one one-millionth of a Curie. A Curie is that quantity of any radioactive substance that undergoes 37 billion nuclear disintegrations per second. Thus a picocurie is that quantity of any radioactive substance that undergoes 0.037 nuclear disintegrations per second.
PIEZOMETRIC SURFACE: See potentiometric surface.
PIN FLOC: Small flocculated particle size.
PLATE AND FRAME PRESS: A batch process dewatering device in which sludge is pumped under high pressure through a series of parallel plates, in which a chamber is created between the plates. Each plate is fitted with filter cloth and the solids are collected in the chambers and the water is filtered from the sludge.
POINT SOURCE DISCHARGE: A pipe, ditch, channel or other container from which pollutants may be discharged.
POLLUTANT: A substance, organism or energy form present in amounts that impair or threaten an ecosystem to the extent that its current or future uses are prevented.
POLLUTION: To make something unclean or impure. See Contaminated.
POLYMER: A type of chemical when combined with other types of coagulants aid in binding small suspended particles to larger particles to help in the settling and filtering processes. Chemical used for flocculation in dewatering. Also known as a "polyelectrolyte" which is a substance made of giant molecules formed by the union of simple smaller molecules.
POLYPHOSPHATES: Chemicals that may be added to remove low levels of iron and manganese.
PORE SPACE: The interstitial space between sediments and fractures that is capable of storing and transmitting water.
POROSITY: A factor representing a rock, soil, or formations percentage of open space available for the percolation and storage of groundwater.
POSITIVE CONTROL: See Ongoing precision and recovery standard.
POST TREATMENT: Treatment of finished water or wastewater to further enhance its quality.
POST-CHLORINE: Where the water is chlorinated to make sure it holds a residual in the distribution system.
POTABLE: Good water which is safe for drinking or cooking purposes. Non-Potable: A liquid or water that is not approved for drinking.
POTENTIAL ENERGY: The energy that a body has by virtue of its position or state enabling it to do work.
POWDERED ACTIVATED CARDON TREATMENT (PACT): A wastewater technology in which powdered activated carbon is added to an anaerobic or aerobic treatment system. The carbon in the biological treatment process acts as a "buffer" against the effects of toxic organics in the wastewater.

PPM: Abbreviation for parts per million.
PRE-CHLORINATION: The addition of chlorine before the filtration process will help:
PRE-CHLORINE: Where the raw water is dosed with a large concentration of chlorine.
PRECIPITATE: A solid that separates from a solution.
PRECIPTATION: The phenomenon that occurs when a substance held in solution passes out of solution into a solid form.
PRELIMINARY TREATMENT: Treatment steps including comminution, screening, grit removal, pre-aeration, and/or flow equalization that prepares wastewater influent for further treatment.
PRESSURE FILTER: Filter unit enclosed in a vessel that may be operated under pressure.
PRESSURE HEAD: The height of a column of water capable of being maintained by pressure. See also Total Head, Total Dynamic Head.
PRESSURE MEASUREMENT: Bourdon tube, Bellows gauge and Diaphragm are commonly used to measure pressure in waterworks systems. A Bellows-type sensor reacts to a change in pressure.
PRESSURE: Pressure is defined as force per unit area. It is usually more convenient to use pressure rather than force to describe the influences upon fluid behavior. The standard unit for pressure is the Pascal, which is a Newton per square meter. For an object sitting on a surface, the force pressing on the surface is the weight of the object, but in different orientations it might have a different area in contact with the surface and therefore exert a different pressure.
PREVENTION: To take action. Stop something before it happens.
PRIMARY CLARIFIER: Sedimentation basin that precedes secondary wastewater treatment.
PRIMARY SLUDGE: Sludge produced in a primary waste treatment unit.
PRIMARY TREATMENT: Treatment steps including sedimentation and/or fine screening to produce an effluent suitable for biological treatment.
PROCESS WASTEWATER: Wastewater generated during manufacture or production processes.
PROCESS WATER: Water that is used for, or comes in contact with an end product or the materials used in an end product.
PROPIONIC ACID: Rod-shaped, pleomorphic, gram-positive, anaerobic; ferment lactic acid; fermentation produces holes in Swiss cheese from the production of carbon dioxide.
PROTON, NEUTRON AND ELECTRON: Are the 3 fundamental particles of an atom.
PROTOZOA: Microscopic animals that occur as single cells. Some protozoa can cause disease in humans. Protozoa form cysts, which are specialized cells like eggs that are very resistant to chlorine. Cysts can survive the disinfection process, then "hatch" into normal cells that can cause disease. Protozoa must be removed from drinking water by filtration, because they cannot be effectively killed by chlorine.
PSEUDOMONAD: Rod-shaped (straight or curved) with polar flagella, gram-negative, aerobic; can use up to 100 different compounds for carbon and energy.
PTFE: Polytetrafluoroethylene.
PUMPING LIFT: The height to which water must be pumped or lifted to, feet of head.

Q

QUANTITATIVE TRANSFER: The process of transferring a solution from one container to another using a pipette in which as much solution as possible is transferred, followed by rinsing of the walls of the source container with a small volume of rinsing solution (e.g., reagent water, buffer, etc.), followed by transfer of the rinsing solution, followed by a second rinse and transfer.
QUICKLIME: A calcium oxide material produced by calcining limestone to liberate carbon dioxide, also called “calcined lime” or “pebble lime”, commonly used for pH adjustment. Chemical formula is CaO.
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R

RADON: A gas that can dissolve and accumulate in underground water sources, such as wells, and in the air in your home. Breathing radon can cause lung cancer. Drinking water containing radon presents a risk of developing cancer. Radon in air is more dangerous than radon in water.
RAW SEWAGE: Untreated wastewater and its contents.
RAW SLUDGE: Undigested sludge recently removed from a sedimentation basin.
RAW TURBIDITY: The turbidity of the water coming to the treatment plant from the raw water source.
RAW WATER: Untreated surface or groundwater.
REAGENT WATER BLANK: see Method blank.
REAGENT WATER: Water demonstrated to be free from the analytes of interest and potentially interfering substances at the method detection limit for the analyte.
REAGENT: A substance used in a chemical reaction to measure, detect, examine, or produce other substances.
RECLAIMED WATER: Wastewater that has been treated to a level that allows for its reuse for a beneficial purpose.

RECLAMATION: The process of improving or restoring the condition of land or other material to a better or more useful state.
RECOMMENDED EXPOSURE LIMIT (REL): An occupational exposure limit that has been recommended by the U.S. National Institute for Occupational Safety and Health to OSHA for adoption as a Permissible Exposure Limit. The REL is a level that NIOSH believes would be protective of worker safety and health over a working lifetime if used in combination with engineering and work practice controls, exposure and medical monitoring, posting and labeling of hazards, worker training and personal protective equipment. No REL has ever been adopted by OSHA, but they have been used as guides by some industry and advocacy organizations.
RECYCLING: The process by which recovered materials are transformed into new products.
REDOX POTENTIAL: Reduction potential (also known as redox potential, oxidation / reduction potential or ORP) is the tendency of a chemical species to acquire electrons and thereby be reduced. Each species has its own intrinsic reduction potential; the more positive the potential, the greater the species' affinity for electrons and tendency to be reduced. In aqueous solutions, the reduction potential is the tendency of the solution to either gain or lose electrons when it is subject to change by introduction of a new species. A solution with a higher (more positive) reduction potential than the new species will have a tendency to gain electrons from the new species (i.e. to be reduced by oxidizing the new species) and a solution with a lower (more negative) reduction potential will have a tendency to lose electrons to the new species (i.e. to be oxidized by reducing the new species). Just as the transfer of hydrogen ions between chemical species determines the pH of an aqueous solution, the transfer of electrons between chemical species determines the reduction potential of an aqueous solution. Like pH, the reduction potential represents an intensity factor. It does not characterize the capacity of the system for oxidation or reduction, in much the same way that pH does not characterize the buffering capacity.
RELATIVE STANDARD DEVIATION (RSD): The standard deviation divided by the mean times 100.
RELAY LOGIC: The name of a popular method of automatically controlling a pump, valve, chemical feeder, and other devices.
RESERVOIR: An impoundment used to store water.
RESIDENCE TIME: The period of time that a volume of liquid remains in a tank or system.
RESPIRATION: Intake of oxygen and discharge of carbon dioxide as a result of biological oxidation.
RETURN ACTIVATED SLUDGE: Settled activated sludge that is returned to mix with raw or primary settled wastewater.
RICKETTSIA: Spherical or rod-shaped, gram-negative, aerobic; cause Rocky Mountain spotted fever and typhus; closely related to Agrobacterium, a common gall-causing plant bacterium.
ROBERT HOOKE: Coined the term "cell" to describe the structures he saw while examining a piece of cork using a microscope.
ROTARY DRUM SCREEN: Cylindrical screen used to remove floatable and suspended solids.
ROTIFER: Rotifers get their name (derived from Greek and meaning "wheel-bearer"; they have also been called wheel animalcules) from the corona, which is composed of several ciliated tufts around the mouth that in motion resemble a wheel. These create a current that sweeps food into the mouth, where it is chewed up by a characteristic pharynx (called the mastax) containing a tiny, calcified, jaw-like structure called the trophi. The cilia also pull the animal, when unattached, through the water. Most free-living forms have pairs of posterior toes to anchor themselves while feeding. Rotifers have bilateral symmetry and a variety of different shapes. There is a well-developed cuticle which may be thick and rigid, giving the animal a box-like shape, or flexible, giving the animal a worm-like shape; such rotifers are respectively called loricate and illoricate.

S

SANITARY SURVEY: Persons trained in public health engineering and the epidemiology of waterborne diseases should conduct the sanitary survey. The importance of a detailed sanitary survey of a new water source cannot be overemphasized. An on-site review of the water sources, facilities, equipment, operation, and maintenance of a public water systems for the purpose of evaluating the adequacy of the facilities for producing and distributing safe drinking water. The purpose of a non-regulatory sanitary survey is to identify possible biological and chemical pollutants which might affect a water supply.
SANITIZER: A disinfectant or chemical which disinfects (kills bacteria), kills algae and oxidizes organic matter.
SATURATED ZONE: Where an unconfined aquifer becomes saturated beneath the capillary fringe.
SATURATION INDEX: See Langelier's Index.
SATURATOR: A device which produces a fluoride solution for the fluoride process. Crystal-grade types of sodium fluoride should be fed with a saturator. Overfeeding must be prevented to protect public health when using a fluoridation system.
SCADA: A remote method of monitoring pumps and equipment. 130 degrees F is the maximum temperature that transmitting equipment is able to with stand. If the level controller may be set with too close a tolerance 45 could be the cause of a control system that is frequently turning a pump on and off.

SCALE: Crust of calcium carbonate, the result of unbalanced water. Hard insoluble minerals deposited (usually calcium bicarbonate) which forms on pool and spa surfaces and clog filters, heaters and pumps. Scale is caused by high calcium hardness and/or high pH. The regular use of stain prevention chemicals can prevent scale.
SCREENINGS PRESS: A mechanical press used to compact and/or dewater material removed from mechanical screening equipment.
SCROLL AND BASKET: The two basic types of centrifuges used in water treatment.
SCRUBBER: A device used to removal particulates or pollutant gases from combustion or chemical process exhaust streams.
SCUM: Floatable materials found on the surface of primary and secondary settling tanks consisting of food wastes, grease, fats, paper, foam, and similar matter.
SECONDARY CLARIFIER: A clarifier following a secondary treatment process, designed for gravity removal of suspended matter.
SECONDARY SLUDGE: The sludge from the secondary clarifier in a wastewater treatment plant.
SECONDARY TREATMENT: The treatment of wastewater through biological oxidation after primary treatment.
SEDIMENT: Grains of soil, sand, gravel, or rock deposited by and generated by water movement.
SEDIMENTATION BASIN: A quiescent tank used to remove suspended solids by gravity settling. Also called clarifiers or settling tanks, they are usually equipped with a motor driven rake mechanism to collect settled sludge and move it to a central discharge point.
SEDIMENTATION BASIN: Where the thickest and greatest concentration of sludge will be found. Twice a year sedimentation tanks should be drained and cleaned if the sludge buildup interferes with the treatment process.
SEDIMENTATION: The process of suspended solid particles settling out (going to the bottom of the vessel) in water.
SEDIMENTATION: The removal of settleable suspended solids from water or wastewater by gravity in a quiescent basin or clarifier.
SENSOR: A float and cable system are commonly found instruments that may be used as a sensor to control the level of liquid in a tank or basin.
SEPTIC: Condition characterized by bacterial decomposition under anaerobic conditions.
SETTLEABILITY: The tendency of suspended solids to settle.
SETTLEABLE SOLIDS: That portion of suspended solids which are of a sufficient size and weight to settle to the bottom of an Imhoff cone in one hour.
SETTLED SLUDGE VOLUME: Volume of settled sludge measured at predetermined time increments for use in process control calculations.
SETTLED SOLIDS: Solids that have been removed from the raw water by the coagulation and settling processes.
SEWAGE: Liquid or waterborne wastes polluted or fouled from households, commercial or industrial operations, along with any surface water, storm water or groundwater infiltration.
SEWER GAS: A gas mixture produced by anaerobic decomposition of organic matter usually containing high percentages of methane and hydrogen sulfide.
SHEATHED: Filamentous, gram-negative, aerobic; “swarmer” (colonizing) cells form and break out of a sheath; sometimes coated with metals from environment.
SHOCK LOAD: A sudden hydraulic or organic load to a treatment plant, also descriptive of a change in the material being treated.
SHOCK: Also known as superchlorination or break point chlorination. Ridding a water of organic waste through oxidization by the addition of significant quantities of a halogen.
SHORT-CIRCUITING: Short Circuiting is a condition that occurs in tanks or basins when some of the water travels faster than the rest of the flowing water. This is usually undesirable since it may result in shorter contact, reaction or settling times in comparison with the presumed detention times.
SHOULD: This action, activity, or procedural step is suggested but not required.
SINGLE PHASE POWER: The type of power used for lighting systems, small motors, appliances, portable power tools and in homes.
SLOP OIL: Separator skimmings and tramp oil generated during refinery startup, shutdown or abnormal operation.
SLUDGE BASINS: After cleaning sludge basins and before returning the tanks into service the tanks should be inspected, repaired if necessary, and disinfected.
SLUDGE BLANKET: The accumulated sludge suspended in a clarifier or other enclosed body of water.
SLUDGE DEWATERING: The removal of a portion or majority of the water contained in sludge by means of a filter press, centrifuge or other mechanism.
SLUDGE DRYING BED: A closed area consisting of sand or other porous material upon which sludge is dewatered by gravity drainage and evaporation.

SLUDGE REDUCTION: Organic polymers are used to reduce the quantity of sludge. If a plant produces a large volume of sludge, the sludge could be dewatered, thickened, or conditioned to decrease the volume of sludge. Turbidity of source water, dosage, and type of coagulant used are the most important factors which determine the amount of sludge produced in a treatment of water.
SLUDGE: Accumulated and concentrated solids generated within a treatment process that have not undergone a stabilization process.
SLURRY: A mixture of a solid and a liquid that facilitates the transfer of the solid into a treatment solution.
SOC: A common way for a synthetic organic chemical such as dioxin to be introduced to a surface water supply is from an industrial discharge, agricultural drainage, or a spill.
SODA ASH: Chemical used to raise pH and total alkalinity (sodium carbonate)
SODIUM BICARBONATE: Commonly used to increase alkalinity of water and stabilize pH.
SODIUM BISULFATE: Chemical used to lower pH and total alkalinity (dry acid).
SODIUM HYDROXIDE: Also known as caustic soda, a by-product chlorine generation and often used to raise pH.
SOFTENING WATER: When the water has a low alkalinity, it is advantageous to use soda ash instead of caustic soda for softening water.
SOFTENING: The process that removes the ions which cause hardness in water.
SOLID WASTE: Garbage, refuse, sludge and other discarded material resulting from community activities or commercial or industrial operations.
SOLID, LIQUID AND VAPOR: 3 forms of matter.
SOLUBILITY: The amount of a substance that can dissolve in a solution under a given set of conditions.
SPADNS: The lab reagent called SPADNS solution is used in performing the Fluoride test.
SPIKING SUSPENSION: Diluted stock suspension containing the organism(s) of interest at a concentration appropriate for spiking samples.
SPIRILLUM: Spiral-shaped, gram-negative, aerobic; include Bdellovibrio, predatory on other bacteria.
SPIROCHETE: Spiral-shaped, gram-negative, mostly anaerobic; common in moist environments, from mammalian gums to coastal mudflats; complex internal structures convey rapid movement; include *Treponemapallidum,* cause of syphilis.
SPOROZOITE: A motile, infective stage of certain protozoans; e.g., *Cryptosporidium*. There are four sporozoites in each *Cryptosporidium* oocyst, and they are generally banana-shaped.
SPRAY BOTTLE OF AMMONIA: An operator should use ammonia to test for a chlorine leak around a valve or pipe. You will see white smoke if there is a leak.
SPRING PRESSURE: Is what maintains contact between the two surfaces of a mechanical seal.
STABILIZATION POND: A large shallow basin used for wastewater treatment by natural processes involving the use of algae and bacteria to accomplish biological oxidation of organic matter.
STERILIZED GLASSWARE: The only type of glassware that should be used in testing for coliform bacteria.
STOCK SUSPENSION: A concentrated suspension containing the organism(s) of interest that is obtained from a source that will attest to the host source, purity, authenticity, and viability of the organism(s).
STUFFING BOX: That portion of the pump that houses the packing or mechanical seal.
SUBNATANT: Liquid remaining beneath the surface of floating solids.
SUCCESSION: Transition in the species composition of a biological community, often following ecological disturbance of the community; the establishment of a biological community in an area virtually barren of life.
SULFATE- AND SULFUR- REDUCING: Commonly rod-shaped, mostly gram-negative, anaerobic; include *Desulfovibrio,* ecologically important in marshes.
SULFIDE: The term sulfide refers to several types of chemical compounds containing sulfur in its lowest oxidation number of -2. Formally, "sulfide" is the dianion, S2-, which exists in strongly alkaline aqueous solutions formed from H2S or alkali metal salts such as Li2S, Na2S, and K2S. Sulfide is exceptionally basic and, with a pKa > 14, it does not exist in appreciable concentrations even in highly alkaline water, being undetectable at pH < ~15 (8 M NaOH). Instead, sulfide combines with electrons in hydrogen to form HS, which is variously called hydrogen sulfide ion, hydrosulfide ion, sulfhydryl ion, or bisulfide ion. At still lower pH's (<7), HS- converts to H2S, hydrogen sulfide. Thus, the exact sulfur species obtained upon dissolving sulfide salts depends on the pH of the final solution. Aqueous solutions of transition metals cations react with sulfide sources (H2S, NaSH, Na2S) to precipitate solid sulfides. Such inorganic sulfides typically have very low solubility in water and many are related to minerals. One famous example is the bright yellow species CdS or "cadmium yellow". The black tarnish formed on sterling silver is Ag2S. Such species are sometimes referred to as salts. In fact, the bonding in transition metal sulfides is highly covalent, which gives rise to their semiconductor properties, which in turn is related to the practical applications of many sulfide materials.
SULFUR- AND IRON- OXIDIZING: Commonly rod-shaped, frequently with polar flagella, gram-negative, mostly anaerobic; most live in neutral (nonacidic) environment.
SUPERNATANT: The liquid layer which forms above the sludge in a settling basin.

SURFACE SEAL: The upper portion of a wells construction where surface contaminants are adequately prevented from entering the well, normally consisting of surface casing and neat cement grout.
SURFACTANT: Surfactants reduce the surface tension of water by adsorbing at the liquid-gas interface. They also reduce the interfacial tension between oil and water by adsorbing at the liquid-liquid interface. Many surfactants can also assemble in the bulk solution into aggregates. Examples of such aggregates are vesicles and micelles. The concentration at which surfactants begin to form micelles is known as the critical micelle concentration or CMC. When micelles form in water, their tails form a core that can encapsulate an oil droplet, and their (ionic/polar) heads form an outer shell that maintains favorable contact with water. When surfactants assemble in oil, the aggregate is referred to as a reverse micelle. In a reverse micelle, the heads are in the core and the tails maintain favorable contact with oil. Surfactants are also often classified into four primary groups; anionic, cationic, non-ionic, and zwitterionic (dual charge).
SUSPENDED SOLIDS: Solids captured by filtration through a 0.45 micron filter membrane.

T

TCE, *trichloroethylene:* A solvent and degreaser used for many purposes; for example dry cleaning, it is a common groundwater contaminant. Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).
TDS-TOTAL DISSOLVED SOLIDS: An expression for the combined content of all inorganic and organic substances contained in a liquid which are present in a molecular, ionized or micro-granular (colloidal sol) suspended form. Generally, the operational definition is that the solids (often abbreviated TDS) must be small enough to survive filtration through a sieve size of two micrometers. Total dissolved solids are normally only discussed for freshwater systems, since salinity comprises some of the ions constituting the definition of TDS. The principal application of TDS is in the study of water quality for streams, rivers and lakes, although TDS is generally considered not as a primary pollutant (e.g. it is not deemed to be associated with health effects), but it is rather used as an indication of aesthetic characteristics of drinking water and as an aggregate indicator of presence of a broad array of chemical contaminants.
TELEMETERING: The use of a transmission line with remote signaling to monitor a pumping station or motors. Can be used to accomplish accurate and reliable remote monitoring and control over a long distribution system.
TEMPERATURE SAMPLE: This test should be performed immediately in the field, a grab sample.
TERTIARY TREATMENT: The use of physical, chemical, or biological means to improve secondary wastewater effluent quality.
The addition of chlorine to the water prior to any other plant treatment processes.
THE RATE DECREASES: In general, when the temperature decreases, the chemical reaction rate decreases also.
THICKENING, CONDITIONING AND DEWATERING: Common processes that are utilized to reduce the volume of sludge.
THICKENING: A procedure used to increase the solids content of sludge by removing a portion of the liquid.
TIME FOR TURBIDITY BREAKTHROUGH AND MAXIMUM HEADLOSS: Are the two factors which determine whether or not a change in filter media size should be made.
TITRATION: A method of testing by adding a reagent of known strength to a water sample until a specific color change indicates the completion of the reaction.
TOTAL ALKALINITY: A measure of the acid-neutralizing capacity of water which indicates its buffering ability, i.e. measure of its resistance to a change in pH. Generally, the higher the total alkalinity, the greater the resistance to pH change.
TOTAL COLIFORM: Total coliform, fecal coliform, and E. coli are all indicators of drinking water quality. The total coliform group is a large collection of different kinds of bacteria. Fecal coliforms are types of total coliform that mostly exist in feces. E. coli is a sub-group of fecal coliform. When a water sample is sent to a lab, it is tested for total coliform. If total coliform is present, the sample will also be tested for either fecal coliform or E. coli, depending on the lab testing method.
TOTAL DISSOLVED SOLIDS (TDS): The accumulated total of all solids that might be dissolved in water. The weight per unit volume of all volatile and non-volatile solids dissolved in a water or wastewater after a sample has been filtered to remove colloidal and suspended solids.
TOTAL DYNAMIC HEAD: The pressure (psi) or equivalent feet of water, required for a pump to lift water to its point of storage overcoming elevation head, friction loss, line pressure, drawdown and pumping lift.
TOTAL SOLIDS: The sum of dissolved and suspended solids in a water or wastewater.
TOTAL SUSPENDED SOLIDS: The measure of particulate matter suspended in a sample of water or wastewater.
TOXIC: Capable of causing an adverse effect on biological tissue following physical contact or absorption.

TRANSIENT, NON-COMMUNITY WATER SYSTEM: TNCWS A water system which provides water in a place such as a gas station or campground where people do not remain for long periods of time. These systems do not have to test or treat their water for contaminants which pose long-term health risks because fewer than 25 people drink the water over a long period. They still must test their water for microbes and several chemicals. A Transient Non-community Water System: Is not required to sample for VOC's.
TREATABILITY STUDY: A study in which a waste is subjected to a treatment process to determine treatment and/or to determine the treatment efficiency or optimal process conditions for treatment.
TRIHALOMETHANES (THM): Four separate compounds including chloroform, dichlorobromomethane, dibromochloromethane, and bromoform. The most common class of disinfection by-products created when chemical disinfectants react with organic matter in water during the disinfection process. See Disinfectant Byproducts.
TUBE SETTLERS: This modification of the conventional process contains many metal tubes that are placed in the sedimentation basin, or clarifier. These tubes are approximately 1 inch deep and 36 inches long, split-hexagonal shape and installed at an angle of 60 degrees or less. These tubes provide for a very large surface area upon which particles may settle as the water flows upward. The slope of the tubes facilitates gravity settling of the solids to the bottom of the basin, where they can be collected and removed. The large surface settling area also means that adequate clarification can be obtained with detention times of 15 minutes or less. As with conventional treatment, this sedimentation step is followed by filtration through mixed media.
TUBERCLES: The creation of this condition is of the most concern regarding corrosive water effects on a water system. Tubercles are formed due to joining dissimilar metals, causing electro-chemical reactions. Like iron to copper pipe. We have all seen these little rust mounds inside cast iron pipe.
TURBIDIMETER: Monitoring the filter effluent turbidity on a continuous basis with an in-line instrument is a recommended practice. Turbidimeter is best suited to perform this measurement.
TURBIDITY: A measure of the cloudiness of water caused by suspended particles. A qualitative measurement of water clarity which results from suspended matter that scatters or otherwise interferes with the passage of light through the water.
TURBIDITY: Turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

U

U.S. ENVIRONMENTAL PROTECTION AGENCY: In the United States, this agency responsible for setting drinking water standards and for ensuring their enforcement. This agency sets federal regulations which all state and local agencies must enforce.
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ULTRAFILTRATION: A low pressure membrane filtration process which separates solutes up to 0.1 micron size range.
UNDER PRESSURE IN STEEL CONTAINERS: After chlorine gas is manufactured, it is primarily transported in steel containers.
UP FLOW CLARIFIER: Clarifier where flocculated water flows upward through a sludge blanket to obtain floc removal by contact with flocculated solids in the blanket.

V

VANE: That portion of an impeller that throws the water toward the volute.
VAPOR: The gaseous phase of a material that is in the solid or liquid state at standard temperature and pressure.
VARIABLE DISPLACEMENT PUMP: A pump that will produce different volumes of water dependent on the pressure head against it.
VELOCITY HEAD: The vertical distance a liquid must fall to acquire the velocity with which it flows through the piping system. For a given quantity of flow, the velocity head will vary indirectly as the pipe diameter varies.
VENTURI: If water flows through a pipeline at a high velocity, the pressure in the pipeline is reduced. Velocities can be increased to a point that a partial vacuum is created.
VERTICAL TURBINE: A type of variable displacement pump in which the motor or drive head is mounted on the wellhead and rotates a drive shaft connected to the pump impellers.
VIBRIO: Rod- or comma-shaped, gram-negative, aerobic; commonly with a single flagellum; include *Vibrio cholerae,* cause of cholera, and luminescent forms symbiotic with deep-water fishes and squids.
VIRUSES: Very small disease-causing microorganisms that are too small to be seen even with microscopes. Viruses cannot multiply or produce disease outside of a living cell.
VIRUSES: are very small disease-causing microorganisms that are too small to be seen even with microscopes. Viruses cannot multiply or produce disease outside of a living cell.

VITRIFICATION: Vitrification is a process of converting a material into a glass-like amorphous solid that is free from any crystalline structure, either by the quick removal or addition of heat, or by mixing with an additive. Solidification of a vitreous solid occurs at the glass transition temperature (which is lower than melting temperature, Tm, due to supercooling). When the starting material is solid, vitrification usually involves heating the substances to very high temperatures. Many ceramics are produced in such a manner. Vitrification may also occur naturally when lightning strikes sand, where the extreme and immediate heat can create hollow, branching rootlike structures of glass, called fulgurite. When applied to whiteware ceramics, vitreous means the material has an extremely low permeability to liquids, often but not always water, when determined by a specified test regime. The microstructure of whiteware ceramics frequently contain both amorphous and crystalline phases.

VOID: An opening, gap, or space within rock or sedimentary formations formed at the time of origin or deposition.

VOLATILE ORGANIC COMPOUNDS (VOCs): Solvents used as degreasers or cleaning agents. Improper disposal of VOCs can lead to contamination of natural waters. VOCs tend to evaporate very easily. This characteristic gives VOCs very distinct chemical odors like gasoline, kerosene, lighter fluid, or dry cleaning fluid. Some VOCs are suspected cancer-causing agents. Volatile organic compounds (VOCs) are organic chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere. A wide range of carbon-based molecules, such as aldehydes, ketones, and other light hydrocarbons are VOCs. The term often is used in a legal or regulatory context and in such cases the precise definition is a matter of law. These definitions can be contradictory and may contain "loopholes"; e.g. exceptions, exemptions, and exclusions. The United States Environmental Protection Agency defines a VOC as any organic compound that participates in a photoreaction; others believe this definition is very broad and vague as organics that are not volatile in the sense that they vaporize under normal conditions can be considered volatile by this EPA definition. The term may refer both to well characterized organic compounds and to mixtures of variable composition.

VOLATILE ORGANIC COMPOUNDS (VOCs): Solvents used as degreasers or cleaning agents. Improper disposal of VOCs can lead to contamination of natural waters. VOCs tend to evaporate very easily. This characteristic gives VOCs very distinct chemical odors like gasoline, kerosene, lighter fluid, or dry cleaning fluid. Some VOCs are suspected cancer-causing agents. Volatile organic compounds (VOCs) are organic chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere. A wide range of carbon-based molecules, such as aldehydes, ketones, and other light hydrocarbons are VOCs. The term often is used in a legal or regulatory context and in such cases the precise definition is a matter of law. These definitions can be contradictory and may contain "loopholes"; e.g. exceptions, exemptions, and exclusions. The United States Environmental Protection Agency defines a VOC as any organic compound that participates in a photoreaction; others believe this definition is very broad and vague as organics that are not volatile in the sense that they vaporize under normal conditions can be considered volatile by this EPA definition. The term may refer both to well characterized organic compounds and to mixtures of variable composition.

VOLATILE: A substance that evaporates or vaporizes at a relatively low temperature.

VOLTAGE: Voltage (sometimes also called electric or electrical tension) is the difference of electrical potential between two points of an electrical or electronic circuit, expressed in volts.[1] It measures the potential energy of an electric field to cause an electric current in an electrical conductor. Depending on the difference of electrical potential it is called extra low voltage, low voltage, high voltage or extra high voltage. Specifically Voltage is equal to energy per unit charge.

VOLUTE: The spiral-shaped casing surrounding a pump impeller that collects the liquid discharge by the impeller.

VORTEX: The helical swirling of water moving towards a pump.

VORTICELLA: Vorticella is a genus of protozoa, with over 100 known species. They are stalked inverted bell-shaped ciliates, placed among the peritrichs. Each cell has a separate stalk anchored onto the substrate, which contains a contracile fibril called a myoneme. When stimulated this shortens, causing the stalk to coil like a spring. Reproduction is by budding, where the cell undergoes longitudinal fission and only one daughter keeps the stalk. Vorticella mainly lives in freshwater ponds and streams - generally anywhere protists are plentiful. Other genera such as Carchesium resemble Vorticella but are branched or colonial.

VULNERABILITY ASSESSMENT: An evaluation of drinking water source quality and its vulnerability to contamination by pathogens and toxic chemicals.

W

WAIVERS: Monitoring waivers for nitrate and nitrite are prohibited.

WASTE ACTIVATED SLUDGE: Excess activated sludge that is discharged from an activated sludge treatment process.

WASTEWATER: Liquid or waterborne wastes polluted or fouled from households, commercial or industrial operations, along with any surface water, storm water or groundwater infiltration.

WATER HAMMER: A surge in a pipeline resulting from the rapid increase or decrease in water flow. Water hammer exerts tremendous force on a system and can be highly destructive.
WATER PURVEYOR: The individuals or organization responsible to help provide, supply, and furnish quality water to a community.
WATER QUALITY CRITERIA: Comprised of both numeric and narrative criteria. Numeric criteria are scientifically derived ambient concentrations developed by EPA or States for various pollutants of concern to protect human health and aquatic life. Narrative criteria are statements that describe the desired water quality goal.
WATER QUALITY STANDARD: A statute or regulation that consists of the beneficial designated use or uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular waterbody, and an antidegradation statement.
WATER QUALITY: The 4 broad categories of water quality are: Physical, chemical, biological, radiological. Pathogens are disease causing organisms such as bacteria and viruses. A positive bacteriological sample indicates the presence of bacteriological contamination. Source water monitoring for lead and copper be performed when a public water system exceeds an action level for lead of copper.
WATER RECLAMATION: The restoration of wastewater to a state that will allow its beneficial reuse.
WATER VAPOR: A characteristic that is unique to water vapor in the atmosphere is that water does not contain any salts.
WATERBORNE DISEASE: A disease, caused by a virus, bacterium, protozoan, or other microorganism, capable of being transmitted by water (e.g., typhoid fever, cholera, amoebic dysentery, gastroenteritis).
WATERSHED: An area that drains all of its water to a particular water course or body of water. The land area from which water drains into a stream, river, or reservoir.
WAVE FUNCTION: A function describing the electron's position in a three-dimensional space.
WHOLE EFFLUENT TOXICITY: The total toxic effect of an effluent measured directly with a toxicity test.
WPCF: Water Pollution Control Facility
WTP: Water Treatment Plant
WWTP: Wastewater Treatment Plant

X

X-RAY DIFFRACTION: A method for establishing structures of crystalline solids using singe wavelength X-rays and looking at diffraction pattern.
X-RAY PHOTOELECTRON SPECTROSCOPY: A spectroscopic technique to measure composition of a material.
X-RAY: Form of ionizing, electromagnetic radiation, between gamma and UV rays.

Y

YIELD: The amount of product produced during a chemical reaction.

Z

ZERO DISCHARGE: A facility that discharges no liquid effluent to the environment.
ZONE MELTING: A way to remove impurities from an element by melting it and slowly travel down an ingot (cast).
ZWITTERION: Is a chemical compound whose net charge is zero and hence is electrically neutral. But there are some positive and negative charges in it, due to the formal charge, owing to the partial charges of its constituent atoms.

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Guidance Manual for Preparation and Review of Removal Credit Applications

Guidance Manual for Preventing Interference at POTWs

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Guidance Manual for the Use of Production-Based Pretreatment Standards and the Combined Wastestream Formula

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Guidance to Protect POTW Workers From Toxic And Reactive Gases And Vapors

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POTW Sludge Sampling and Analysis Guidance Document

Pretreatment Compliance Monitoring and Enforcement Guidance

RCRA Information on Hazardous Wastes for Publicly Owned Treatment Works

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Dr. James Barnard, Global Practice and Technology Leader at Black & Veatch
Jeanette Brown, Executive Director of the Stamford Water Pollution Control Authority and Adjunct Professor of Environmental Engineering at Manhattan College
Dr. H. David Stensel, Professor of Civil and Environmental Engineering at the University of Washington

EPA technical reviews of the document were performed by:
EPA Office of Research and Development
Donald Brown
George Moore
Douglas Grosse
Richard Brenner
James Smith
Marc Mills
Dan Murray
EPA Headquarters
Donald Anderson
Phil Zahreddine
James Wheeler
EPA Regions
David Pincumbe, Region 1
Roger Janson, Region 1
Dave Ragsdale, Region 10, Office of Water and Watersheds

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External technical reviews of the document were performed by
Dale E. Kocarek, Ohio Water Environment Association
Y. Jeffrey Yang, USEPA Office of Research and Development

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