WASTEWATER PRIMER
FOR ARMY INSTALLATIONS

Prepared by:

Surface Water and Wastewater Program

U.S. Army Center for Health Promotion and Preventive Medicine

Introduction

This ***Primer*** provides an overview of the wastewater program at Army installations. It is not meant to be an educational tool, but an easy reference to the numerous environmental aspects arising from the Clean Water Act. The Primer summarizes the regulatory requirements for wastewater, storm water, sewage sludge, spills, and conservation. In addition, it briefly discusses wastewater treatment technology, sewer systems, and security. If you have any questions about these topics or any other issues in the surface water and wastewater environmental area, please contact us at (410) 436-3816 or **william.fifty@apg.amedd.army.mil.** If we don't have the answer to your question, we'll try to find it.

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January 2005

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Wastewater Permitting

If you discharge wastewater to waters of the U.S., you are required to have a National Pollutant Discharge Elimination System (NPDES) Permit. How does the NPDES system work? First, it establishes pollutant limitations and monitoring requirements for each wastewater discharge, and then it requires the permit holder to monitor these waste streams and report failures to the appropriate regulatory agency. The U.S. Environmental Protection Agency (EPA) is authorized to issue all NPDES permits; however, this authority can be delegated to the states. Currently 41 states are approved to regulate Federal facilities, while NPDES permitting in the other 9 states is handled by the regional EPA authority. State program status is summarized online at: http://cfpub2.epa.gov/npdes/statestats.cfm.

NPDES Permitting Process.

- A permit application is filed 180 days before the current permit expires or a new discharge begins.
- A draft permit is issued by the regulator. This draft permit includes a fact sheet which explains the rationale and assumptions used in deriving the permit limits.
- A public comment period follows (about 30 days). This is the time for reviewing the draft permit and asking for variances. The discharger will be precluded from challenging the final permit if arguments are not presented at this time.
- The final permit becomes effective 30 days after issuance.

The NPDES permit is much like a contract between the discharger and regulator; it is almost impossible to change during the term of the permit unless conditions change or it is issued with a reopener clause. Permits are normally issued for a fixed term of 5 years; however, many permits are being renewed for shorter durations so that their expiration dates coincide with other permittees within the watershed.

What should you do when you receive your draft permit from the regulator?

1st Compare the draft permit with the existing permit. If the draft permit has new requirements or is more stringent, you need to evaluate the basic assumptions and calculations used in the fact sheet. If there is a discrepancy, you need to notify the regulator.

2nd Compare the draft permit discharge limitations with 12 months of effluent data. This comparison should indicate whether you will have a compliance problem with the existing parameters that carryover to the new permit. For new requirements or unachievable effluent limitations, you will need to negotiate a compliance schedule with the regulator. This compliance schedule will provide an opportunity to investigate potential source reductions, upgrade the existing wastewater treatment system, or conduct a period of effluent monitoring to determine compliance status with new parameters.

If you discharge wastewater to surface water, you are required to have a Federal or state permit.

Currently, USACHPPM is available to review draft NPDES permits for Army installations. Contact Ms. Wendy Mervine at (410) 436-3816. This service is being funded by the U.S. Army Environmental Center.

In recent years, rules and regulations have been promoting the concept of watershed management. A key part of this approach is watershed based permitting and the development of total maximum daily loads (TMDLs). When a surface water is identified as impaired (that is, it is not meeting the state water quality standards for its designated use), the regulator is required to develop a TMDL to resolve this noncompliance. This TMDL restricts the total contaminant loading on the receiving water body to an acceptable level and distributes the load among the available sources. The sources include not only point-source wastewater discharges, but also estimates for nonpoint sources (to include air deposition) and future loads. The normal end result is much more stringent limitations on current point source discharges.

Wastewater Discharge Classifications. There are two types of point-source wastewater discharges – industrial and municipal. The municipal discharge is from a municipality or regional sewer authority, and the treatment system is normally identified as a publicly owned treatment works (POTW). Because Army installations are not municipalities, their wastewater discharges have been historically classified as industrial – regardless of the source. In 1992, federally owned wastewater treatment systems that treat primarily domestic sewage were first identified as federally owned treatment works (FOTW). This designation allows Federal facilities a limited domestic sewage exclusion to treat certain industrial wastewaters without violating the Resource Conservation and Recovery Act (RCRA).

Another differentiation is between direct and indirect discharges. A direct discharge is to surface waters and is regulated by an NPDES permit issued by the EPA or state, whereas an indirect discharge is to a regional or municipal wastewater collection system. In this latter case, you do not have an NPDES permit. Instead, you are regulated by the POTW under the EPA's pretreatment standards. This control can be as simple as a general sewer use ordinance prohibiting certain discharges to the sewer system or as complicated as a comprehensive wastewater discharge permit issued by the POTW.

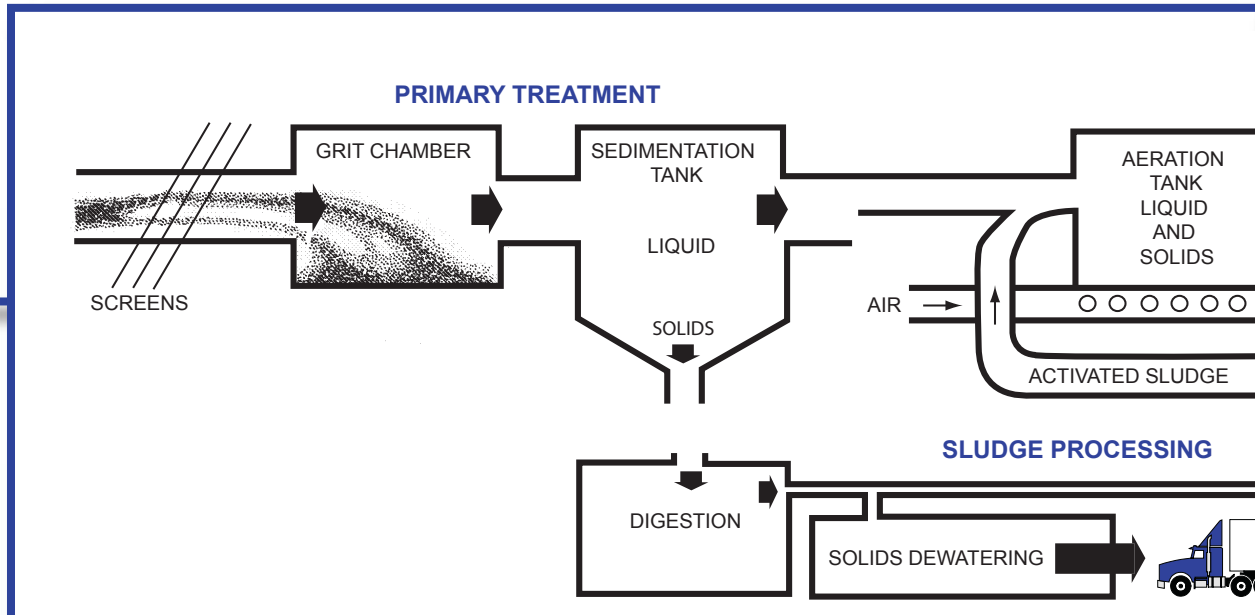
Wastewater Treatment

The goal of wastewater treatment is to produce a stream of water that is safe for return to the environment. Usually the treatment consists of two basic stages, primary and secondary, along with a process to dispose of the removed solids.

In primary treatment, the objective is to physically remove suspended solids from the wastewater. As sewage enters the wastewater treatment plant, it flows through a screen which removes large objects such as rags and sticks that can clog pipes or damage equipment. It then passes onto the grit chamber where cinders, sand, and small stones can settle to the bottom. In some cases, comminutors are used to cutup solids into a smaller size. After this preliminary treatment, the sewage contains organic and inorganic matter along with other suspended solids as minute particles. Many of these solids can be removed from sewage by treatment in a sedimentation tank. When the speed of the sewage flow through one of these tanks is reduced, the suspended solids gradually sink to the bottom where they form a mass of solids called primary sludge. This sludge is usually removed by pumping it to a sludge digestion system.

After the effluent leaves the sedimentation tank in the primary stage of treatment, it flows to the secondary treatment process which removes about 85 percent of the organic matter. This removal is the result of the respiration and growth of the microorganisms present in the wastewater. The two principal techniques are trickling filters and the activated sludge process.

A trickling filter is often a bed of stones from 3 to 6 feet deep through which sewage passes. More recently, interlocking pieces of corrugated plastic or other synthetic media have also been used in trickling beds. Microorganisms gather and multiply on these stones until they can consume most of the organic matter in the sewage. The treated water trickles out through pipes in the bottom and



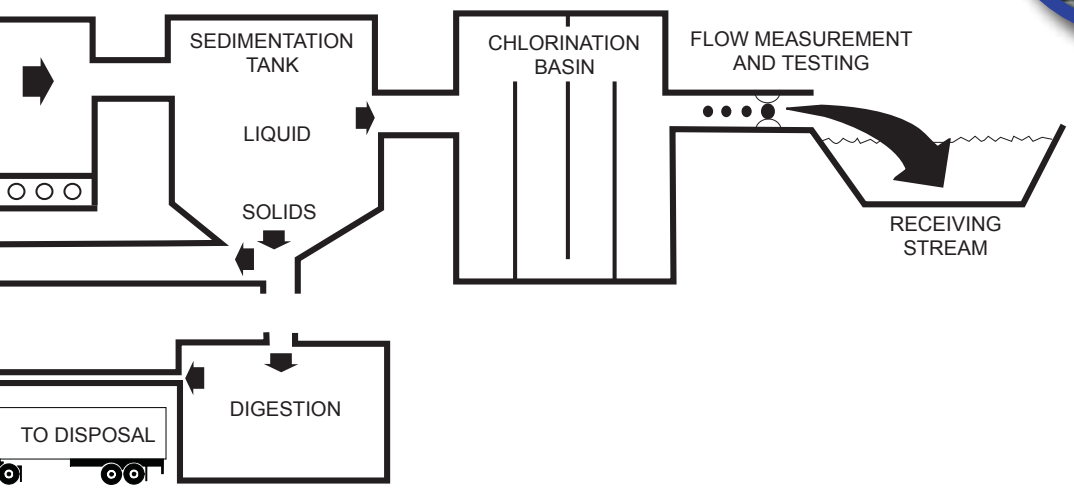
recirculates back to the head of the trickling filter or flows to another sedimentation tank to remove excess settleable material.

In recent years, the trend has been towards the use of activated sludge instead of trickling filters. On leaving the sedimentation tank in the primary stage, the wastewater flows to an aeration tank where it is thoroughly mixed with air and return sludge and retained for several hours. During this time, the microorganisms break down the organic matter into harmless by-products. From the aeration tank, the sewage flows to a second sedimentation tank for removal of excess settleable material. The collected sludge, now activated with millions of bacteria and other tiny organisms, can be returned to the aeration tank or sent off to sludge conditioning and disposal.

The final step in any wastewater treatment system is generally disinfection – normally this is accomplished through effluent chlorination. Disinfection will kill more than 99 percent of the harmful pathogens in the effluent. Many states now require the removal of excess chlorine before discharging to surface waters. Alternatives to chlorine disinfection, such as ultraviolet light, are also being used in situations where chlorinated effluents can be harmful to fish and other aquatic life.

Higher quality effluents can also be produced with advanced wastewater treatment techniques (for example, filtration). These high quality effluents are needed for discharges to sensitive waters or nonpotable reuse.

SECONDARY TREATMENT



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Storm Water

Storm water is defined as surface runoff and drainage from natural precipitation, such as rain water and snow melt. When the EPA first began to consider storm water regulation, it decided to split the regulation into two phases.

The **Storm Water Phase I** rules were finalized in 1990 and included most industrial activities (to include Army installations), large municipalities, and certain construction activities. Instead of issuing individual permits, the EPA opted for general permits through its regional offices. The general permit is defined as an NPDES permit that authorizes a category of point-source discharges within a geographical area – in this case, it would be storm water within the EPA region. The general permit has two advantages: it is economical for it allows a large number of facilities to be covered under a single permit, and it ensures consistent permit conditions among similar type facilities. It should be noted that the regulator goes through the whole permitting process (permit development, public notice and comments, and issuance of final permit) before the discharger files for coverage. This latter action is called filing a Notice of Intent (NOI) for coverage under the General Permit. Similar to individual NPDES permits, states are delegated the authority to administer the General Permits Program.

Over the years, the Storm Water Phase I rules have shifted from the Baseline General Permit to the Multi-Sector General Permit. This latter permit targets certain industrial categories with specific best management practices (BMPs) and monitoring requirements. It also requires certifications for historical preservation and endangered species. Nonetheless, the basic requirement of the Storm Water Phase I rules remains the development of a Storm Water Pollution Prevention Plan.

The Storm Water Pollution Prevention Plan identifies the industrial sources of storm water pollution and describes the BMPs that are used to reduce storm water exposure. Normally, there is a regulatory requirement for an annual review and update of the Storm Water Pollution Prevention Plan – to include identifying new sources of pollution and evaluating existing BMPs.

Some typical Army activities that are normally addressed in the installation's Storm Water Pollution Prevention Plan include:

- DRMO Yards (scrap yards, hazardous waste storage, battery storage, used oil)
- Hazardous Waste Storage Buildings (RCRA permitted sites)
- Solid Waste Management Units (those with exposed materials)
- Recycling Centers
- Landfills (that have received industrial waste)
- Sewage Treatment Plants (>1 million gallons/day design)
- Transportation Motor Pools (maintenance of vehicle fleets)
- Bulk Petroleum Areas
- Open Burning / Open Detonation Areas (RCRA permitted sites)

Surprisingly most installation Storm Water Pollution Prevention Plans include a number of activities that should not be addressed within the plan. For example, the category "Transportation Motor Pools" encompasses only those facilities that maintain commercial-type vehicle fleets such as taxis and buses. Most unit motor pools on Army installations would not fall into this category and should be excluded from the installation storm water plan.

The Storm Water Phase II rules expand on the Phase I program and were promulgated in December 1999. They encompass any small municipal separate storm sewer system (MS4) within an urbanized area and small construction sites. By definition, Federal facilities (to include Army installations) would qualify as a small MS4 if they have their own separate storm sewer system and are located in an urbanized area. The location and boundaries of urbanized areas are defined by the Federal Census and detailed in the reference maps at: http//factfinder.census.gov/servlet/BasicFactsServlet. According to the regulations, only that portion of the facility that falls within the urbanized area is required to be permitted under Phase II.

The major thrust of the Phase II rules is to further reduce the discharge of pollutants to surface waters by controlling the remaining sources of unregulated storm water. It identifies six minimum control measures and outlines requirements (shall) and recommended actions (should) for each.

- Public education and outreach
- Public involvement and participation
- Illicit discharge detection and elimination
- Construction site storm water runoff control
- Post-construction storm water management in new development and redevelopment
- Pollution prevention/good housekeeping for municipal operations

Similar to Phase I, the permitting authorities issued General Phase II permits – requiring the submittal of an NOI for Phase II permit coverage. This NOI must include appropriate BMPs and measurable goals for each of the six minimum control measures, timing and frequency of actions, and the name of the person responsible for these actions.

USACHPPM has created a variety of educational materials for public education and outreach. They are available for distribution throughout the Army. Similarly, the EPA has developed educational materials for public use and has issued a collection of suggested BMPs in a published guidance document, “Storm Water Phase II Compliance Assistance Guide,” EPA 833-R-00-002, March 2000.

Construction Storm Water Permitting. Construction activities that disturb 1 acre or more are regulated under the NPDES storm water program. Operators of these construction sites are required to obtain permit coverage from the EPA (Construction General Permit) or an authorized state and develop and implement storm water pollution prevention plans that are aimed primarily at controlling erosion. It is recommended that the construction site operators be required to obtain and maintain storm water permit coverage as part of their contracts.

Sewage Sludge (Biosolids)

There are two major options for the disposal of sewage sludge from POTWs/FOTWs – burying it in a solid waste landfill or land applying it as a soil amendment (normally by incorporation into the soil). The EPA uses the term "biosolids" to refer to sewage sludge that can be beneficially recycled.

Land application of biosolids was regulated in February 1993 by the "Part 503 rule." This rule is self implementing which means that it must be followed even without the issuance of a permit. It established two classes of biosolids based upon:

- pollutant limitations on certain metals, and
- pathogen[1] and vector[2] attraction reductions. These reductions are generally obtained through proper sludge conditioning.

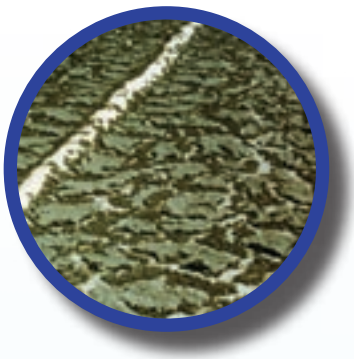
Class A is considered exceptional quality biosolids. It has low metals content, no detectable levels of pathogens, and does not attract vectors. When applied to the land, there are virtually no restrictions.

Although treated, Class B biosolids still contain detectable levels of pathogens. When applied to the land, it has buffer requirements and public access and crop harvesting restrictions. The Army tends to produce Class B biosolids.

To land apply biosolids, there must first be an evaluation of the site for its suitability – to include water supplies, soil characteristics, slopes, vegetation, crop needs, and the distance to surface and ground water. In addition, a nutrient management plan is needed to provide a match between the amount of biosolids applied and the nutrient uptake required for the on-site vegetation.

[1] Pathogens are the bacteria, virus, and parasites that cause disease

[2] Vectors are the rodents, birds, or insects that spread disease by carrying or transferring pathogens.



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CMOM (Capacity, Management, Operation, and Maintenance)

As part of the proposed Sanitary Sewer Overflow rule (which has been withdrawn from publication), wastewater permit holders would be required to develop a CMOM Program for their sanitary sewer systems. The intent of this program is to provide information on the operation and maintenance of the wastewater collection system. Elements of the program would include: overflow response, system evaluation and capacity assurance, and compliance auditing. Although not currently required, a CMOM evaluation could be helpful for improving the performance of the wastewater system.

Security

Unlike drinking water systems, there is currently no regulatory requirement to conduct wastewater system vulnerability assessments. Nonetheless, the EPA allocated $1 million in fiscal year 2004 for states to provide security-related training to small wastewater utilities. Similar training (Associated Metropolitan Sewer Authority's Vulnerability Self Assessment Tool) is available through the Water Environment Federation. For information on this training, you can contact our wastewater vulnerability expert, Mr. Andrew Maly at (410) 436-3816.

Sustainability

Sustainability is a concept that is currently being promoted Army-wide for maintaining the ongoing mission. Water sustainability relies on two basic mechanisms: conservation and reclamation/reuse.

Conservation can be described as the reduction in potable water consumption. Executive Order 13123 (3 June 1999) requires all Federal facilities to reduce potable water consumption by implementing water efficiency programs. Subsequent guidance established Federal water conservation goals and required each Federal agency to develop a water management plan and implement 4 water efficiency BMPs from a suggested list of 10. The Army has passed this requirement down to the installations with deadlines of October 2004 for developing the water management plans, and 2010 for implementing the BMPs.

Reclamation/reuse (1 of the 10 BMPs) is sometimes called source substitution because it replaces high quality water with a lower grade that can be used for nonpotable reuse. Army installations offer a number of opportunities for reclamation and reuse of wastewaters: landscape irrigation (golf course and parade fields), toilet flushing at nonresidential buildings, vehicle washing and motor pool operations, and various industrial applications.

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Oil and Hazardous Substance Spills

There are two regulatory aspects to spills of oil and hazardous materials. One is spill prevention planning and the other is spill contingency planning. Both require installation documentation.

The **Spill Prevention Control and Countermeasure Plan** (SPCCP) is the primary spill prevention document. It is federally mandated for the storage and handling of certain quantities of oil, and it describes the structural designs, equipment and procedures that are used to prevent spills from reaching navigable waters. Army Regulation 200-1 (Environmental Protection and Enhancement) has expanded the scope of this document to include hazardous substances. The basic content of the SPCCP is outlined in Title 40, Code of Federal Regulations, Part 112 (Oil Pollution Prevention). On July 17, 2002, this rule was amended, resulting in substantive changes to the SPCCP. Currently installations have until February 17, 2006 to revise their existing SPCCP per this new guidance, and until August 18, 2006 to implement the changes.

The **Installation Spill Contingency Plan** (ISCP) is the basic spill response planning document for Army installations. It provides detailed information on spill response actions, description of available resources, duties of responders, and procedures for spill notification. This plan, which is required by the National Contingency Plan, is identified in Army Regulation 200-1. Installations with the potential to cause “substantial harm” to the environment from an oil spill (based on a combined storage of more than 1 million gallons) have a Federal requirement to develop a Facility Response Plan, as outlined in 40 CFR 112, Appendix F. If an installation develops a Facility Response Plan, then it does not need a separate ISCP. Because of the numerous requirements to develop emergency spill response plans under various environmental legislations, the EPA published guidance in June 1996 (also available from USACHPPM) to consolidate these documents into a single comprehensive plan called an Integrated Contingency Plan or “One Plan.” However, there is no obligation to do so.

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Notes

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