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Storm Water Management Fact Sheet

Non-Storm Water Discharges to Storm Sewers

DESCRIPTION

Identifying and eliminating non-storm water discharges to storm sewers is an important and very cost-effective Best Management Practice (BMP) for improving runoff water quality. Non-storm water discharges can include discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, or sanitary wastes, and are typically the result of unauthorized connections of sanitary or process wastewater drains to storm sewers. These connections are common, yet often go undetected. Typically these discharges are significant sources of pollutants, and, unless regulated by an NPDES permit, they are also illegal.

Environmental impact evaluations have shown that the elimination of non-storm water discharges is an effective BMP, because such discharges may contain a significant loading of pollutants.

Several studies exist on the contents of non-storm water discharges. Pitt and Shawley (1982) reported that non-storm water discharges were found to contribute substantial quantities of a variety of pollutants, even though the individual concentrations of each pollutant were not high. During extended periods of base flow conditions, the lower concentration was offset, leading to a substantial loading of pollutants. Gartner, Lee and Associates, Ltd. (1983) conducted an extensive survey of non-storm water discharges in the Humber River watershed (Toronto). Out of 625 outfalls, about 10 percent were considered significant pollutant sources. Further investigations identified many industrial and sanitary non-storm water discharges into the storm drainage system.

Sources found in industrial areas included liquid dripping from animal hides stored in tannery yards, and washdowns of storage yards at meat packing facilities. Therefore, it is anticipated that elimination of non-storm water discharges will be a highly effective BMP.

Identifying and eliminating non-storm water discharges has rarely been done at industrial facilities. Part of the problem is education: many facility operators are unaware of what constitutes a non-storm water discharge and what the potential environmental impacts of these discharges are. Compliance with NPDES permit requirements for the presence of non-storm water discharges will greatly improve the implementation of this BMP.

APPLICABILITY

Almost every industrial facility that has not been tested or evaluated for the presence of potential non-storm water discharges should be so evaluated. Typically NPDES permit certification includes:

- Identification of potential non-storm water discharges.
- Results of a site evaluation for the presence of non-storm water discharges.
- The evaluation criteria or test method used.
- The date of testing and/or evaluation.
- The on-site drainage points that were directly observed during the test and/or evaluation.

This certification must be signed in accordance for the facility's NPDES storm water permit. A sample certification form is shown in Figure 1.

ADVANTAGES AND DISADVANTAGES

Identifying and eliminating non-storm water discharges can be an easy and cost-effective method for preventing runoff contamination and pollution of receiving water bodies. However, identifying these discharges may be problematic. Possible problems in identifying non-storm water discharges include:

- A non-storm water discharge may not occur on the date of the test or evaluation.
- The method used to test or evaluate the discharge may not be applicable to the situation.
- A lack of available data on the location of storm drains and sanitary sewers, especially in older industrial facilities, may make identifying an illicit connection difficult.

KEY PROGRAM COMPONENTS

Key program criteria include identifying and locating non-storm water entries into storm drainage and investigating their sources.

For any effective investigation of pollution within a storm water system, all pollutant sources must be included. For many pollutants, storm water may contribute the smaller portion of the total pollutant mass discharge from a storm drainage system. In addition to conventional storm water runoff associated with rainfall, pollutant sources may include dry-weather entries occurring during both warm and cold months and snowmelt runoff. Consequently, much less pollution reduction benefit will occur if only storm water is considered in a control plan for controlling storm drainage discharges.

The investigations may also identify illicit point source outfalls that do not carry storm water. Obviously, these outfalls also need to be controlled and permitted. Figure 1 can be used as a sample worksheet to report non-storm water discharges.

There are four primary methods for investigating non-storm water discharges.

Visual Inspection

The simplest method for detecting non-storm water connections in the storm water collection system is to observe all discharge points during periods of dry weather. Key parameters to look for are the presence of stains, smudges, odors, and other abnormal conditions.

Sanitary and Storm Sewer Map Review

A review of a plant schematic is another simple way to determine if there are any unauthorized connections to the storm water collection system. A sanitary or storm sewer map, or plant schematic, is a map of pipes and drainage systems used to carry

NON-STORM WATER DISCHARGE ASSESSMENT AND CERTIFICATION			Worksheet Completed By: _____ Title: _____ Date: _____ Signature: _____		
Date of Test or Evaluation	Outfall Directly Observed During the Test (Identify as indicated on the site map)	Method Used to Test or Evaluate Discharge	Describe Results from Test for the Presence of Non-Storm Water Discharge	Identify Potential Significant Sources	Name of Person Who Conducted the Test or Evaluation

Source: U. S. EPA, 1992.

FIGURE 1 SAMPLE WORKSHEET FOR RECORDING NON-STORM WATER DISCHARGES

process wastewater, non-contact cooling water, and sanitary wastes. These maps (especially as-built plans) should be reviewed to verify that there are no unauthorized connections. However, a common problem at many sites is that they often do not have accurate or current schematics.

Dye Testing

Another method for detecting improper connections to the storm water collection system is dye testing. A dye test can be performed by simply releasing a dye (either pellet or powder) into either the sanitary or process wastewater system. Discharge points from the storm water collection system are then examined for color change.

Sampling and Chemical Analysis

Sewer mapping and visual inspection are also helpful in identifying locations for sampling. Chemical tests are needed to supplement the visual or physical inspections. Chemical tests can help quantify the approximate components of the discharge mixture at the outfall or discharge point. Samples should be collected, stored, and analyzed in accordance with standard quality assurance and quality control (QA/QC) procedures. Statistical analysis of the chemical test results can be used to estimate the relative magnitudes of the various flow sources. In most cases, non-storm water discharges are made up of many separate sources of flow, such as leaking domestic water systems, sanitary discharges, ground water infiltration, automobile washwater, etc. Key parameters that can be helpful in identifying the source of the non-storm water flows include biochemical oxygen demand (BOD), chemical oxygen demand (COD), total organic carbon (TOC), specific conductivity, temperature, fluoride, hardness, ammonia, ammonium, potassium, surfactant fluorescence, pH, total available chlorine, and toxicity screening. It may be possible to identify the source of the non-storm water discharge by examining the flow for specific chemicals.

Just as high levels of pathogenic bacteria are usually associated with a discharge from a sanitary waste water source, the presence of certain chemicals is generally associated with specific industries. Table 1, includes a listing of various chemicals that may be associated with a variety of activities.

IMPLEMENTATION

Identification of non-storm water discharges should be part of every facility's maintenance program. Facilities should conduct annual inspections for non-storm water discharges, even if previous tests have found no such discharges. New processes, building additions, or other plant changes may have brought about unauthorized connections to the storm water conveyance system.

COSTS

The above methods are mostly time-intensive; therefore, the cost is dependent on the level of effort employed, and on the level of expertise. Visual inspections are the least expensive of the three. Dye testing may be more cost effective for buildings that do not have current schematics of their sanitary and storm sewer systems. The cost of disconnecting illicit discharges from the storm water system will vary depending on the type and location of the connection.

The full use of all of the applicable procedures is most likely necessary to identify all pollutant sources. For example, attempting to reduce costs by examining only a certain class of outfalls, or using inappropriate testing procedures, will significantly reduce the utility of the testing program and result in inaccurate conclusions.

REFERENCES

1. California Environmental Protection Agency, Draft, 1992. *Staff Proposal for Modification to Water Quality Order No. 91-13 DWQ Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities*.

2. Gartner, Lee and Associates, Ltd., 1983. *Toronto Area Watershed Management Strategy Study, Technical Report No. 1, Humber River and Tributary Dry Weather Outfall Study*. Ontario Ministry of the Environment, Toronto, Ontario.

TABLE 1 CHEMICALS COMMONLY FOUND IN INDUSTRIAL DISCHARGES

Chemical	Industries
Acetic Acid	Acetate rayon, pickle and beetroot manufacture
Alkalis	Cotton and straw kiering, cotton manufacture
Ammonia	Gas and coke manufacture, chemical manufacture
Arsenic	Sheep-dipping, felt mongering
Chlorine	Laundries, paper mills, textile bleaching
Chromium	Plating, chrome tanning, aluminum anodizing
Cadmium	Plating
Citric Acid	Soft drinks and citrus fruit processing
Copper	Plating, pickling, rayon manufacture
Cyanides	Plating, metal cleaning, case-hardening, gas manufacture
Fats, Oils	Wool scouring, laundries, textiles, old refineries
Fluorides	Gas and coke manufacture, chemical manufacture, fertilizer plants,
Formalin	Manufacture of synthetic resins and penicillin
Hydrocarbons	Petrochemical and rubber factories
Hydrogen Peroxide	Textile bleaching, rocket motor testing
Lead	Battery manufacture, lead mining, paint manufacture, gasoline
Metcaptins	Oil refining, pulp mills
Mineral Acids	Chemical manufacture, mines, iron and copper pickling, brewing, textiles
Nickel	Plating
Nitro Compounds	Explosives and chemical works
Organic Acids	Distilleries and fermentation plants
Phenols	Gas and coke manufacture, synthetic resin manufacture, textiles,
Silver	Plating and photography
Starch	Food, textile, wallpaper manufacture
Sugars	Dairies, foods, sugar refining, preserves, wood process
Sulfides	Textiles, tanneries, gas manufacture, rayon manufacture
Sulfites	Wood process, vicose manufacture, bleaching
Tannic Acid	Tanning, sawmills
Tartaric Acid	Dyeing, wine, leather, and chemical manufacture
Zinc	Galvanizing, plating, viscose manufacture, rubber process

Source: Pitt *et al.,* 1992.

3. Pitt, R. and G. Shawley, 1982. *A Demonstration of Non-Point Pollution Management on Castro Valley Creek*, Alameda County Flood Control District (Hayward, California) and U.S. EPA, Washington, DC.

4. Pitt, R., D. Barbe, D. Adrian, and R. Field, 1992. *Investigation of Inappropriate Pollution Entries Into Storm Drainage Systems -- A Users Guide*, U.S. EPA, Edison, New Jersey.

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6. U.S. EPA, 1992. *Storm Water Management For Industrial Activities: Developing Pollution Prevention Plans and Best Management Practice.* EPA 833-R-92-006.

7. Washington State Department of Ecology, February, 1992. *Storm Water Management Manual for the Puget Sound Basin*.

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