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Storm Water Management For Construction Activities

Developing Pollution Prevention Plans And Best Management Practices

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FOREWORD

This manual provides detailed guidance on the development of storm water pollution prevention plans and identification of appropriate Best Management Practices (BMPs) for construction activities It provides technical assistance and support for all construction activities subject to pollution prevention requirements established under National Pollutant Discharge Elimination System (NPDES) permits for storm water point source discharges.

EPA's storm water program significantly expands the scope and application of the existing NPDES permit system for municipal and industrial process wastewater discharges. It emphasizes pollution prevention and reflects a heavy reliance on BMPs to reduce pollutant loadings and improve water quality. This manual provides essential guidance in both of these areas.

This document was issued in support of EPA regulations and policy initiatives involving the development and implementation of a National storm water program This document is Agency guidance only. It does not establish or affect legal rights or obligations Agency decisions in any particular case will be made applying the laws and regulations on the basis of specific facts when permits are issued or regulations promulgated.

This document will be revised and expanded periodically to reflect additional pollution prevention information and data on treatment effectiveness of BMPs Comments from users will be welcomed. Send comments to U S. EPA, Office of Wastewater Enforcement and Compliance, 401 M Street, SW, Mail Code EN-336, Washington, DC 20460.

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CHAPTER 1

INTRODUCTION

1.1 PURPOSE OF THIS GUIDANCE MANUAL

The purpose of this guidance manual is to help you develop and implement a Storm Water Pollution Prevention Plan specifically designed for your construction site With the help of this guidance you should be able to put together most aspects of the plan using your own construction managers and engineers

As part of its efforts to expand the use and benefits of pollution prevention practices, the U.S. Environmental Protection Agency (EPA) expects that most National Pollutant Discharge Elimination System (NPDES) storm water permits for construction activities, both individual and general permits, may require this type of plan, including the NPDES General Permit for Storm Water Discharges from Construction Activities That Are Classified As "Associated with Industrial Activity" (referred to as EPA's Baseline Construction General Permit) Although specific components of a Storm Water Pollution Prevention Plan may vary from one storm water permit to another, many of the general concepts described in this manual are common to all plans.

1.2 ORGANIZATION OF THIS GUIDANCE MANUAL

This manual is organized to function as a user's guide to meet Storm Water Pollution Prevention Plan requirements The step-by step guidelines and checklists in the following sections walk you through the process of developing a Storm Water Pollution Prevention Plan The checklists are designed to help you organize the required information. The remainder of this manual is divided into a number of sections Chapter 2 provides an overview of the process of developing and implementing a Storm Water Pollution Prevention Plan, and Chapters 3-6 are resources for selecting Best Management Practices (BMPs) and controls to use as part of your plan. Using this information, you will develop and implement your plan following the basic phases listed below. Each phase is important and should be completed before moving on to the next one·

- Site Planning and Design Development Phase
- Assessment Phase
- Control Selection/Plan Design Phase
- Notification/Approval Phase
- Implementation/Construction Phase
- Final Stabilization/Termination Phase

Developing a Storm Water Pollution Prevention Plan is, therefore, a six-phase process. Because most aspects of the Storm Water Pollution Prevention Plan take a significant amount of planning, its development must be closely connected to the development of your overall site plan for construction. You must keep storm water considerations in mind as you develop your site plan. The Initial Site Planning/Design Development Phase starts the process. The next phase, the Assessment Phase, involves gathering information about your site, such as determining drainage patterns and runoff coefficients. Then you will enter the Control Selection/Plan Design Phase, using the information collected during the Assessment Phase to select BMPs. Following Control Selection and Plan Design is the Certification/Notification Phase. In this phase the plan is certified by the owner and operator of the construction project and a notice is sent to the government agency which is responsible for NPDES permits in your area. The next stage is the Implementation/Construction Phase, during which you put your Storm Water Pollution Prevention Plan to action and construct your facility. Periodic reviews, inspections, and evaluations will allow you to keep the plan up-to-date and effective. Finally, as construction activities are completed, you reach the Final Stabilization/Termination Phase during which you put into place permanent controls.

Chapter 5 provides recommendations to assist the readers in selecting the most appropriate BMPs. A combination of these types of BMPs may be most appropriate for your site.

In addition, there are a few appendices included in the back of this manual Appendix A includes checklists relating to specific elements of Storm Water Pollution Prevention Planning. Appendix B provides technical design specifications for the BMPs described in Chapters 3 and 4 Appendix C shows what a model plan should look like. Appendix D lists references and resources. Appendix E contains a glossary of terms. Appendix F contains a list of hazardous substances and reportable quantities. Appendix G lists references for rainfall data Appendix H lists efficiencies for several types of BMPs.

1.3 DEFINITIONS

Throughout this manual you will see four key words and phrases used over and over A solid understanding of these concepts is very important in meeting the goals of storm water management discussed above.

The first term of importance is "Storm Water Pollution Prevention Plan (SWPPP)." As mentioned in Section 1.1, this manual is designed to help you to prepare and implement a Storm Water Pollution Prevention Plan. As you will learn in Chapter 2, storm water pollution prevention consists of a series of phases and activities to, first, characterize your site, and then, to select and carry out actions which prevent the pollution of storm water discharges

The next term is NPDES Storm Water Permit or permit. NPDES is an acronym for National Pollutant Discharge Elimination System. NPDES is the National program for issuing, modifying, revoking, etc., permits under Sections 307, 318, 402, and 405 of the Clean Water Act (CWA). A permit is an authorization issued by EPA or an approved State to discharge under certain specified conditions.

The other term used throughout this manual is "Best Management Practice" or BMP. BMPs are measures or practices used to reduce the amount of pollution entering surface waters, air, land, or ground waters. BMPs may take the form of a process, activity, or physical structure. Some BMPs are simple and can be put into place immediately, while others are more complicated and require extensive planning They may be inexpensive or costly This manual describes numerous BMPs which you may use as part of your Storm Water Pollution Prevention Plan.

The final term used frequently in this manual is "operator." The operator of a construction activity is the party or parties that either individually or taken together meet the following two criteria: (1) they have operational control over the site specifications (including the ability to make modifications in specifications); and (2) they have the day-to-day operational control of those activities at the site necessary to ensure compliance with plan requirements and permit conditions (e.g., are authorized to direct workers at the site to carry out activities identified in the plan).

1.4 GOALS OF EROSION AND SEDIMENT CONTROL AND STORM WATER MANAGEMENT

EPA's November 16, 1990, storm water final rule addresses certain types of storm water discharges, including storm water discharges from construction activities. This regulation is based on the results of a number of National studies which pointed to storm water discharges as a significant source of pollutants and cause of water use impairment in receiving streams. Storm water runoff becomes polluted by picking up soil particles and other pollutants (from construction materials) as it flows over surfaces where construction activities are occurring. By requiring certain construction sites to apply for NPDES storm water permits, this regulation provides a way for States and EPA Regions to monitor and manage these discharges, and reduce or ultimately eliminate the amount of pollutants present in them. The basic goal of storm water management, therefore, is simple.

IMPROVE WATER QUALITY BY REDUCING POLLUTANTS IN STORM WATER DISCHARGES

Construction activities produce many different kinds of pollutants which may cause storm water contamination problems. Grading activities remove grass, rocks, pavement and other protective ground covers resulting in the exposure of underlying soil to the elements. Because the soil surface is unprotected, soil and sand particles are easily picked up by wind and/or washed away by rain or snow melt This process is called erosion. The water carrying these particles eventually reaches a stream, river or a lake where it slows down, allowing the particles to fall onto the bottom of the stream bed or lake This process is called sedimentation. Gradually, layers of these clays and silt build up in the stream beds choking the river and stream channels and covering the areas where fish spawn and plants grow These particles also cloud waters causing aquatic respiration problems and can kill fish and plants growing in the river stream.

In addition, the construction of buildings and roads may require the use of toxic or hazardous materials such as petroleum products, pesticides, and herbicides, and building materials such as asphalt, sealants and concrete which may pollute storm water running off of the construction site. These types of pollutants often contain small amounts of metals and other toxic materials which may be harmful to humans, plants, and fish in streams.

Considering the nature of construction activities and the resulting pollutants, and the variable nature of storm events, EPA determined that the best approach to storm water management for these sites is through the use of self-designed Storm Water Pollution Prevention Plans. These plans are based on the use of BMPs For construction sites, there are three main types of BMPs, those that prevent erosion, others which prevent pollutants from the construction materials from mixing with storm water, and those which trap pollutants before they can be discharged Although these three types of BMPs have different functions, the basic principle is the same these BMPs are designed to prevent, or at least control, the pollution of storm water before it has a chance to affect receiving streams. Using BMPs in this way is called storm water management or sediment and erosion control.

1.5 LIMITATIONS OF THIS MANUAL

This manual provides useful information on many sediment and erosion and storm water management controls which you can use to prevent or reduce the discharge of sediment and other pollutants in storm water runoff from your site This manual describes the practices and controls, tells how, when, and where to use them, and how to maintain them However, the effectiveness of these controls lies fully in your hands. Although specific recommendations will be offered in the following chapters, keep in mind that careful consideration must be given to selecting the most appropriate control measures based on site-specific features, and on properly installing the controls in a timely manner. Finally, although this manual provides guidelines for maintenance, it is up to you to make sure that your controls are carefully maintained or they will prove to be ineffective.

This manual describes some of the EPA Baseline General Permit requirements for pollution prevention plans. However, requirements may vary from permit to permit. You should read your permit to determine the required components of your pollution prevention plan. This manual does describe "typical" permit requirements. However, do not assume that the typical permit requirements described in this manual are the same as your permit requirements, even if you are included under an NPDES general permit for storm water discharges from construction activities that are classified as "Associated with Industrial Activities " Permit conditions may vary between different permits and/or different versions of the permit

This manual also does not describe State or local requirements for erosion and sediment control or for storm water management Although it is expected that, in most cases, plan requirements will be similar, you should contact your State or local authorities to determine what their requirements are

EPA has issued a number of regulations addressing pollution control practices for different environmental media (i e., land, water, air, and ground water). However, this manual focuses on identifying pollution prevention measures and BMPs specifically for storm water discharges from construction activities and provides guidance to industrial facilities on how to comply with storm water permits

Although Storm Water Pollution Prevention Plans primarily focus on storm water, it is important to consider the impacts of selected storm water management measures on other environmental media (i.e., land, air, and ground water) For example, if the water table is unusually high in your area, a retention pond for contaminated storm water may also lead to contamination of a ground water source unless special preventive measures are taken EPA strongly discourages this transfer of pollution from one environmental medium to another and prohibits the adoption of any storm water management practice that results in a violation of other Federal, State, or local environmental laws.

For instance, under EPA's July 1991 Ground Water Protection Strategy, States are encouraged to develop Comprehensive State Ground Water Protection Programs. Your facility's efforts to control storm water should be compatible with the ground water protection objectives reflected in your State's program

1.6 ADDITIONAL INFORMATION

Although this manual describes many potential control measures for construction sites, there are additional resources Some references are listed in Appendix D of this manual Many State and local sediment and erosion control agencies have published BMP documents specifically for construction activities A few of these are listed in Appendix D. For other documents, State and local agencies should be contacted directly

CHAPTER 2

STORM WATER POLLUTION PREVENTION PLAN

The Storm Water Pollution Prevention Plan is the focus of your NPDES storm water permit and is the key to controlling pollutants in storm water discharges Therefore, proper and careful development and implementation of the plan will maximize the potential benefits of pollution prevention and sediment and erosion control measures. Your permit consists of specific requirements for the plan, including deadlines and certain storm water control measures This Chapter provides a step-by-step explanation of how to develop and implement your Storm Water Pollution Prevention Plan.

The process of developing and implementing a Storm Water Pollution Prevention Plan for construction activities has been divided into six phases which are indicated in Figure 2.1, These phases are:

1. Site Evaluation and Design Development
2. Assessment
3. Control Selection/Plan Design
4. Certification/Notification
5. Construction/Implementation
6. Final Stabilization/Termination.

The following sections describe the processes involved in each of the phases listed above. The pollution prevention plan is developed during the first three phases listed above.

Your NPDES storm water permit may specify deadlines for plan development and implementation. The sequence in Figure 2 1 assumes that pollution prevention plans will be completed and implemented at the time the project breaks ground and revised (if necessary) as construction proceeds Your plan should be in place before project initiation because construction operations pose environmental risks as soon as activity begins. The initial rough grading activities may contribute a significant amount of pollutants to storm water runoff Be sure to read your permit closely to see what dates and deadlines apply to your site

The planning for pollution prevention measures should be done while you develop the site construction plan. The best Storm Water Pollution Prevention Plans are developed at the same time as the design of the site plan. However, if you have completed your site plan design before you begin to prepare the Storm Water Pollution Prevention Plan it is not necessary to start the process all over again. Much of the information needed for the plan should already be included in your design documents. A Storm Water Pollution Prevention Plan can be prepared for most construction projects by using information from the existing design, and modifying the design to accommodate the controls.

Responsibility for developing a Storm Water Pollution Prevention Plan typically lies with the owner of the property that is being developed, or with the owner and operator (e.g., General Contractor) of the construction project

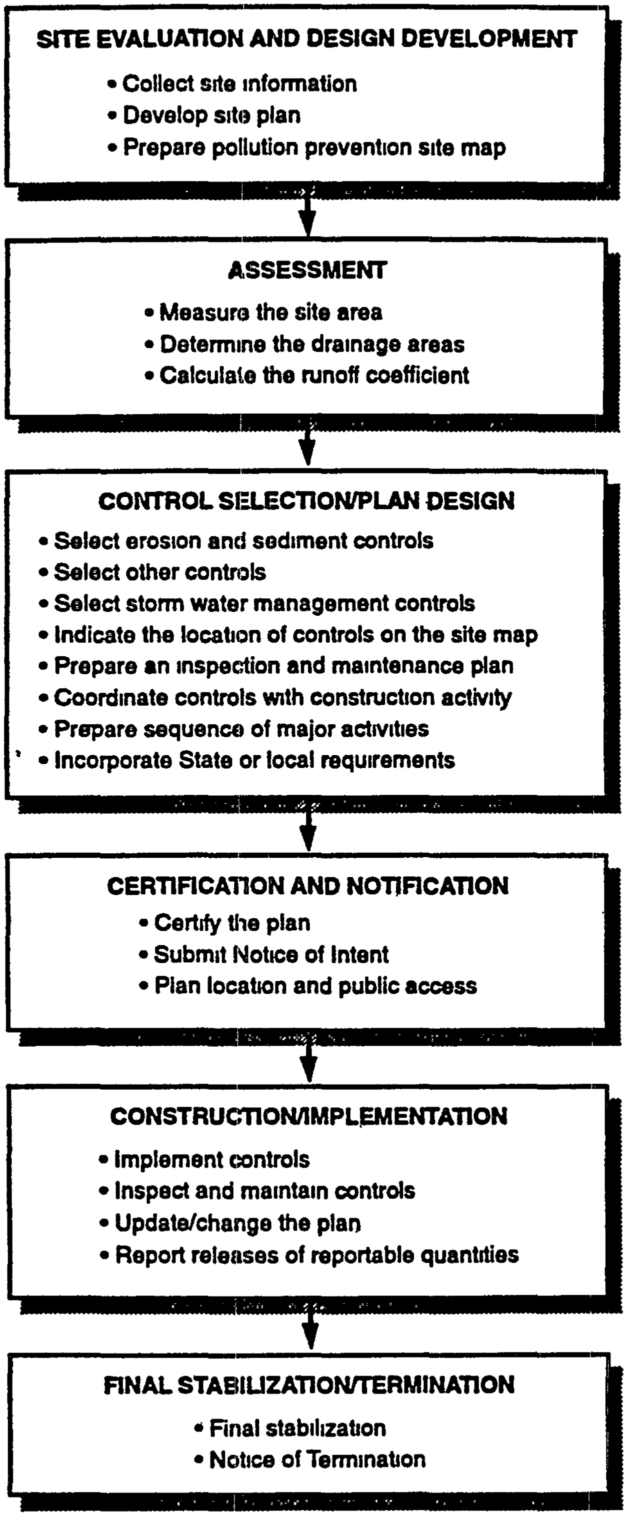
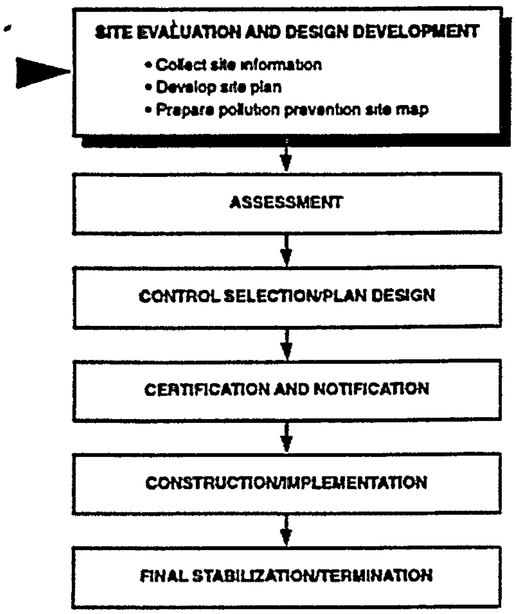


FIGURE 2 1 DEVELOPING AND IMPLEMENTING A STORM WATER POLLUTION PREVENTION PLAN FOR CONSTRUCTION

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Storm Water Pollution Prevention Plan Development Parts IV.A.1, 2, and 3. Storm Water Pollution Prevention Plans should be fully developed and implemented upon submitting the Notice of Intent (NOI) to be covered by the general permit. The operator should comply with the terms and schedule of the plan beginning with the initiation of construction activities or October 1, 1992, whichever is later. This requirement applies to existing construction sites on October 1, 1992, as well as new sites which begin construction after this date.



2.1 SITE EVALUATION AND DESIGN DEVELOPMENT

The first phase in a preparing a Storm Water Pollution Prevention Plan for a construction project is to define the characteristics of the site and of the type of construction which will be occurring. This phase is broken down into three tasks: collect site information, develop site plan, and prepare site map. The following subsections describe each of these tasks.

2.1.1 Collect Site Information

The first phase in preparing a pollution prevention plan is to collect information on the site which will be developed. The following items are suggested.

Existing Conditions Site Map

Obtain a map of the existing conditions at the site This map will be the starting point for the site map required by the pollution prevention plan The map should be to scale and preferably topographic The map should indicate the existing land use for the site (i.e., wooded area, open grassed area, pavement, building, etc.) as well as the location of surface waters which are located on or next to the site (Surface waters include wetlands, streams, rivers, lakes, ponds, etc.). The best way to obtain a site map is to have your site surveyed by a professional surveyor (either land based or aerial) If it is not practical to survey the site, then topographic maps may be available from your State or local government A final alternative is to use the United States Geological Survey (USGS) topographical maps. USGS maps are least desirable for use as a site map for a pollution prevention plan because they are only available in a very large scale (1:24,000) and the features of a construction site would be very difficult to distinguish. The scale of the map should be small enough so that you can easily distinguish important features such as drainage swales and control measures.

Soils Information

Determine the type of soils present on the site This information should be based upon information from your specific site, not regional characteristics You may use the Soil Conservation Service's (SCS) Soils Map of your area to determine types of soil on your site. The SCS Soil Surveys are excellent sources of information for surface soils and typically will indicate if a soil is erodible Even more accurate information may be obtained by performing soil borings at the site, this method is more expensive and is usually only required for some storm water practices such as infiltration. Soil borings may already be required for the design of foundations or other structures.

Runoff Water Quality

Collect any information on the quality of the runoff from the site which may be available. In many cases, there will be little water quality data from runoff collected specifically from a site, however, if your construction site is located on or next to an existing industrial facility, or if it drains to a municipal separate storm sewer in a city/county with a population greater than 100,000, water quality data may have been collected which indicates the quality of runoff from your site. Contact either the industrial facility or the municipal storm sewer authority which will receive your storm water and ask if they have performed any analysis on storm water from your proposed construction site You may also be able to obtain runoff water quality information from the U.S. Geological Survey (USGS), the USDA Soil Conservation Service (SCS), State or local watershed protection agencies Contact these agencies to see if they have collected samples of runoff from your site or from locations down stream of your site

Name of Receiving Water

Identify the name of the body of water(s) which will receive runoff from the construction site If the receiving water is a tributary include the name of the ultimate body of water if possible. Receiving waters could include, rivers, lakes, streams, creeks, runs, estuaries, wetlands, bays, ocean, etc If the site drains into a Municipal Separate Storm Sewer System, identify the system and indicate receiving water to which the system discharges. This information is usually available from county, State, or USGS maps

Rainfall Data

It is useful to determine the amount of rainfall you will anticipate in your design of storm water management measures These rainfall amounts are often referred to as "design storms." Design storms are typically described in terms of the average amount of time that passes before that amount of rain falls again and by the duration of the rain (e g., the 10 year-24 hour storm) Contact your State/local storm water program agency for additional information on the design storm criteria in your project area Consult Appendix G for sources of design storm data if it is not available from your State/local agency

2.1.2 Develop Site Plan

The next step in the process is to develop a preliminary site plan for the facility which is to be constructed The site plan will be developed primarily based upon the goals and objectives of the proposed facility However, there are several pollution prevention principals which should be considered when developing the site plan for the project. They are:

- Disturb the smallest vegetated area possible.

- Keep the amount of cut and fill to a minimum.

- Limit impacts to sensitive areas such as.

  - Steep and/or unstable slopes
  - Surface waters, including wetlands
  - Areas with erodible soils
  - Existing drainage channels

In addition to reducing pollution in storm water runoff from your site, incorporating the above objectives into the site plan for the project can also. reduce construction costs for grading and landscaping, reduce the amount of sediment and storm water management controls, and improve the aesthetics of the completed project.

Once the preliminary design is developed, you should prepare a narrative description of the nature of the construction activity to include in the Storm Water Pollution Prevention Plan. The narrative should provide a brief description of the project including the purpose of the project (the final result); the major soil disturbing activities that will be necessary to complete the project, and the approximate length of time it will take to complete the project.

You might describe the purpose of construction (goal or project result) as one of the following; residential development, commercial, industrial, institutional, office development, highway projects, roads, streets, or parking lots, recreational areas, or underground utility.

When you describe soil disturbing activities you might include one or more of the following; clearing and grubbing, excavation and stockpiling, rough grading, final or finish grading, preparation for seeding or planting, excavation of trenches, demolition, etc.

The description of the construction activity does not need to address indoor construction activities that will not have any affect on the quality of storm water For example, it is not necessary to describe the construction of indoor wiring for a building in the narrative if the wiring will not be installed until after the building is enclosed.

2.1.3 Prepare Site Map

When the site plan is complete for your construction project, the information should be transferred onto the pollution prevention plan site map (Note the construction site plan and the Storm Water Pollution Prevention Plan site map can be the same map) At this phase in the Storm Water Pollution Prevention Plan development, there are three things which can be indicated on the site map: the approximate slopes after grading, the drainage pattern, and the areas of disturbance. [Note the surface waters should already be indicated on the map (see Section 2.1.1).] Appendix C includes an example site map for a Storm Water Pollution Prevention Plan. It may be helpful to refer to this while reading this section.

Approximate Slopes after Grading

It is suggested that you indicate the revised grades on the same topographic map as the existing grades You should use two separate symbols for existing contours and proposed contour (i e., dashed and solid lines) Topographic maps indicating existing and proposed contours for a site are suggested because it is easy to determine the areas which must be disturbed for regrading.

If you do not prepare a topographic map of the site, then you should examine the proposed plan for the site and indicate on the site map the approximate location, direction and steepness of slopes. The location and direction of the slope may be indicated by arrows (pointing from high to low) and numbers indicating the degree of slope. Slope is usually expressed as a ratio of the length it takes to decrease one foot in height, e.g., 3:1 indicates that the slope takes 3 feet in length to drop one foot in height.

Areas of Soil Disturbance

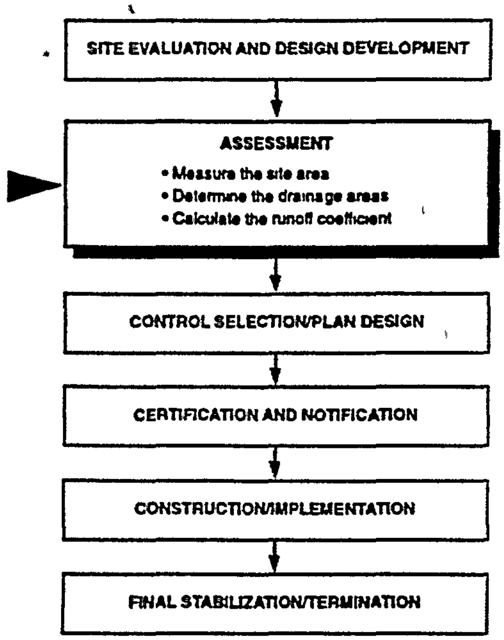
After indicating the proposed grading on the site map, the next phase is to indicate the entire area which will be disturbed by the construction activity. The suggested method for indicating this area is to draw a "limit of disturbance" line on the site plan You should draw the limit of disturbance so that any soil disturbing activity such as: clearing, stripping, excavation, backfill, stock piling (topsoil or other fill material), and paving will be inside of the limit. The limit of disturbance should also include roads for construction vehicles unless those roads are paved (or stabilized) and have measures to reduce tracking of sediments. When drawing the line try to leave room for the control structures which may be required (this may be difficult, but you can always redraw the limit of disturbance after you design the control structures). The limit of disturbance should be a closed boundary line around the entire disturbed area. There can be "islands" of undisturbed area inside the limit of disturbance, for example, a tree or group of trees which are to be preserved. These islands should be encircled with a limit of disturbance

Drainage Patterns

In addition to the slopes anticipated after grading, and areas of soil disturbance your Storm Water Pollution Prevention Plan site map should also indicate the drainage patterns of the site after the major grading activities

The suggested method for showing this is with a topographic map of the site which indicates drainage basin boundaries and drainage channels or pipes. A drainage basin for the purposes of the Storm Water Pollution Prevention Plan is an area of the site in which water, sediments and dissolved materials drain to a common outlet (such as a swale or storm drain pipe) from the site. There can be one or more drainage basins on a site. Drainage boundaries are closed lines which start and end at the common outlet. Drainage boundaries typically follow the high points on a site including hill tops, ridges, roads, etc. Drainage areas do not overlap. To determine the drainage basin boundaries, ask yourself where will rain falling on this portion flow off of the site. Areas that drain to different points are in different drainage areas. Drainage boundaries can be changed by grading and structural controls. The site map should indicate the drainage boundaries after the major grading has occurred or structural controls installed It may be necessary to change the drainage boundaries after you select your structural controls If you do not provide a topographic site map, use arrows to indicate which direction water will flow Show the areas where there will be overland flow and the location of swales or channels If there is a new or proposed underground storm drain system on the site then this should be indicated on the Storm Water Pollution Prevention Plan site map as well. It is recommended that the pipe diameter and slope also be included on the site map.

Please note that the Storm Water Pollution Prevention Plan site map is not complete until you have indicated the locations of the major control structures and the areas where stabilization is expected to occur. These items are discussed in Section 3.3.4.



2.2 ASSESSMENT

After the characteristics of the site and the construction have been defined, the next phase in developing a Storm Water Pollution Prevention Plan is to measure the size of the land disturbance and estimate the impact the project will have on storm water runoff from the site from the information developed in phase 1. There are three tasks which should be done to assess the project, they are: measure site area, measure drainage areas, and calculate runoff coefficient.

2.2.1 Measure Site Area

Typically, NPDES storm water permits may require that you indicate in the Storm Water Pollution Prevention Plan estimates of the total site area and the area which will be disturbed You will need the Storm Water Pollution Prevention Plan site map which clearly shows the site boundary and the limit of disturbance The area of the site can usually be found on the deed of sale for the property, the record plat, site survey, or the site plan The amount of area to be disturbed is sometimes noted on a site plan, or grading plan. If the information is not available from one of these sources you may measure using the grid method or by using a planimeter.

The most accurate method to measure area from the site map is with a planimeter. A planimeter is a device which can measure the area on a drawing by tracing its outline. Planimeters are available from Engineering and Surveyor Supply Stores.

If you do not have access to a planimeter and do not wish to buy one, the grid method is an easy method for estimating the size of an area which only requires transparent graph or grid paper. The steps are as follows.

1. Place graph or grid paper over the scale drawing and trace the outline of the entire property.

2. Count the total number of complete squares within the site area, count every two partial squares along the edges of the site as one square.

3. Divide the total number of squares by the number of squares in one square inch of graph/grid paper This results in an estimate of the number of square inches contained in the outline of the site.

4. Multiply the result of Step 3 by the number of square feet in a one inch square based on the scale of the drawing. This results in an estimate of the number of square feet on the site.

5 The last step is to divide the number of square feet on the site by 43,560 square feet per acre to see how many acres there are. The result is an estimate of the site area in acres. Repeat this method using the outline of the disturbed area to find the estimated acreage of soil disturbing activities.

Example.

The site plan pictured below (Figure 2.2) is drawn to a 1 inch equals 200 feet scale (1":200'). After tracing the boundary and counting the number of squares, the result is 620 1/4-inch squares.

Divide 620 by the number of 1/4-inch squares per square inch, which in this case is 16 (the number of 1/4-inch squares in a square inch is 16). The result is 38 75 one-inch squares.

Multiply 38 75 square inches by the number of square feet per square inch, 40,000 square feet per square inch (based on the scale of this drawing that would be 200' times 200'). The result is 1,550,000 square feet

The final step is to convert the estimated area from square feet to acres by dividing by 43,560 square feet per acre into the total number of square feet The final result is 35 6 acres.

The area should be expressed in acres to the nearest tenth of an acre, e.g , 5.5 acres total site area and 3 5 acres disturbed area.

The first measurement which you should make is to determine the total area of the site. The total area of the site should include the area inside the project's property boundaries, easements and/or right-of-ways The total area includes both the disturbed and undisturbed areas. The second measurement which you should make is the area which will be disturbed by the construction project This area can be determined by measuring the area enclosed by the limit of disturbance drawn in on the site map (see Section 2 1.2) and subtracting from this value the area of any undisturbed "islands" within the limit of disturbance. The disturbed area should always be less than or equal to the total site area

2.2.2 Determine the Drainage Areas

The final areas which you should measure are the size of each drainage basins for each point where concentrated flow will leave the site Although you do not need to put this information into the pollution prevention plan, you will need this data to help you select and design the sediment control and storm water management measures for your project

For design of the sediment control measures, you will need to know the area of the portion of each drainage basin which will be disturbed The disturbed areas of the drainage basins should be measured using the methods suggested above to estimate the area enclosed by the limit of disturbance and/or the drainage boundary (whichever boundary gives the smaller area).

For the design of the storm water management controls and for the calculation of the runoff coefficient, you should measure the total area of each drainage basin and the areas of each land use which will occur in the basin after the construction is complete. Be sure to include offsite water draining onto your site when determining the total size of the drainage basin. See Table 2.1 for a listing of different types of land uses The area of each land use in the drainage basins should be measured using the methods suggested above to estimate the area enclosed by the land use boundary and/or the drainage boundary (whichever boundary gives the smaller area). Topographic maps are helpful tools to use in determining drainage boundaries.

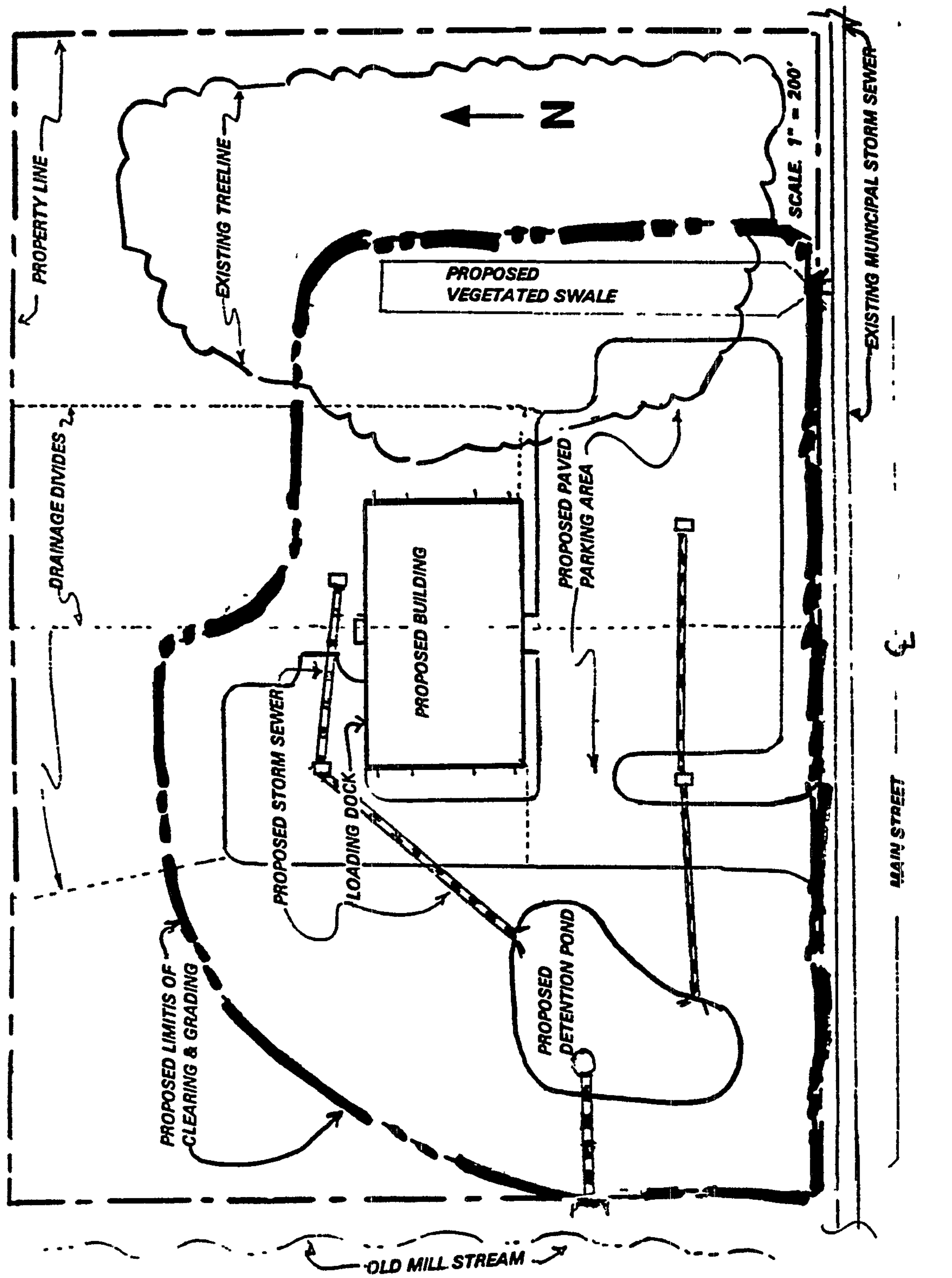


FIGURE 2.2 SAMPLE SITE PLAN

2.2.3 Calculate the Runoff Coefficient

The next step in the assessment phase is to develop an estimate of the development's impact on runoff after construction is complete This can be done by estimating a runoff coefficient for post construction conditions The runoff coefficient ("C" value) is the partial amount of the total rainfall which will become runoff The runoff coefficient is used in the "rational method" which is:

$$Q = CIA,$$

where

Q = the rate of runoff from an area
I = rainfall intensity, and
A = the area of the drainage basin.

There are many methods which can be used to estimate the amount of runoff from a site You are not required to use the rational method to design storm water conveyances or management measures Consult your State/local design guides to determine what methods to use for estimating design flow rates from your development

The less rainfall that is absorbed (infiltrates) into the ground, evaporates, or is otherwise absorbed on site, the higher the "C" value For example, the "C" value of a lawn area is 0.2, which means that only 20 percent of the rainfall landing on that area will run off, the rest will be absorbed or evaporate A paved parking area would have a "C" value of 0.9, which means that 90 percent of the rainfall landing on that area will become runoff The "C" value which you are being asked to calculate is the one that represents the final condition of the site after construction is complete. It is suggested that a runoff coefficient be calculated for each drainage basin on the site. The following is an example of how to calculate the "C" value.

The runoff coefficient or "C" value for a variety of land uses may be found in Table 2 1. These "C" values provide an accurate estimate of anticipated runoff for particular land uses Most sites have more than one type of land use and therefore more than one "C" value will apply. To have a "C" value that represents your site you will need to calculate a "weighted C value "

Calculating a "Weighted C"

When a drainage area contains more than one type of surface materials with more than one runoff coefficient a "weighted C" must be calculated This "weighted C" will take into account the amount of runoff from all the various parts of the site A formula used to determine the "weighted C" is as follows

$$C = \frac{A_1 C_1 + A_2 C_2 ... A_x C_x}{\Sigma \text{ of } A}$$

where A = acres and C = coefficient

Therefore, if a drainage area has 15 acres (ac) with 5 paved acres (C = .9), 5 grassed acres (C = .2), and 5 acres in natural vegetation (C = 1), a "weighted "C" would be calculated as follows

TABLE 2.1 TYPICAL "C" VALUES (ASCE 1960)

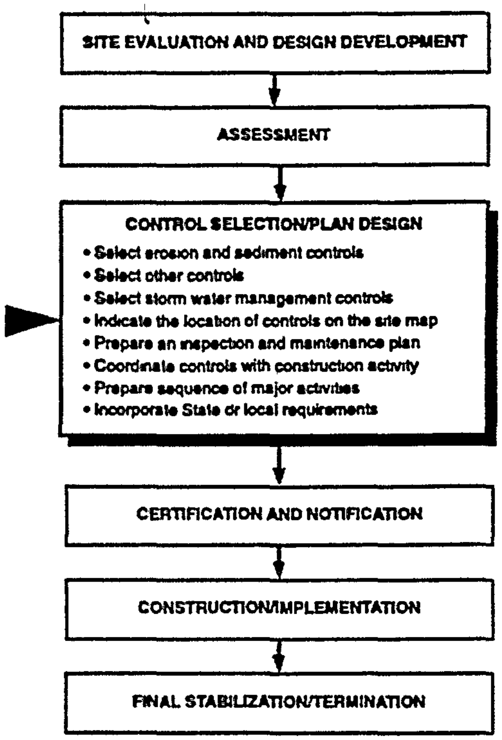
Description of Area	Runoff Coefficients
Business	
Downtown Areas	0.70-0.95
Neighborhood Areas	0.50-0.70
Residential	
Single-family areas	0.30-0.50
Multiunits, detached	0.40-0 60
Multiunits, attached	0.60-0.75
Residential (suburban)	0.25-0.40
Apartment dwelling areas	0.50-0 70
Industrial	
Light Areas	0.50-0.80
Heavy areas	0.60-0.90
Parks, cemeteries	0 10-0.25
Playgrounds	0.20-0.35
Railroad yard areas	0.20-0.40
Unimproved areas	0.10-0.30
Streets	
Asphalt	0.70-0.95
Concrete	0.80-0.95
Brick	0 70-0.85
Drives and walks	0.75-0 85
Roofs	0.75-0.95
Lawns - course textured soil (greater than 85% sand)	
Slope· Flat, 2%	0.05-0.10
Average, 2-7%	0.10-0.15
Steep, 7%	0.15-0 20
Lawns - fine textured soil (greater than 40% clay)	
Slope. Flat, 2%	0.13-0.17
Average, 2-7%	0.18-0.22
Steep, 7%	0.25-0.35

$$C = \frac{(5\ ac.\ x\ .9) + (5\ ac.\ x\ .2) + (5\ ac.\ x\ .1)}{(5\ ac. + 5\ ac. + 5\ ac.)}$$

$$C = \frac{(4.5\ ac.) + (1.0\ ac.) + (.5\ ac.)}{(15\ ac.)}$$

$$C = \frac{6.0\ ac.}{15\ ac.}$$

$$C = .4$$



2.3 CONTROL SELECTION/PLAN DESIGN

Once you have collected the information and made measurements, the next step is to design a plan to prevent and control pollution of storm water runoff from your construction site. Your Storm Water Pollution Prevention Plan should address: erosion and sediment controls, storm water management controls and other controls. The following subsections detail how the controls which you select should be described in the Storm Water Pollution Prevention Plan; however, the methods of selecting the appropriate measures and detailed information about the measures are contained in the following chapters.

2.3.1 Select Erosion and Sediment Controls

The first types of controls which your pollution prevention plan should address are erosion and sediment controls. These controls include stabilization measures for disturbed areas and structural controls to divert runoff and remove sediment Erosion and sediment controls are implemented during the construction period to prevent and/or control the loss of soil from the construction site into the receiving waters Erosion and sediment controls can include temporary or permanent measures

Your selection of the most appropriate erosion and sediment controls for your construction project depends upon a number of factors, but is most dependent on site conditions The information collected in the site evaluation, design and assessment steps is used to select controls. Chapter 3 provides a series of questions and answers to assist you in selecting the most appropriate measures for your site There is also a description of the more commonly used sediment and erosion control measures in Chapter 3 and Appendix B provides typical design information for many of the measures described in Chapter 3. Please use these portions of this manual to help you select and design the sediment and erosion controls for your site

2.3.2 Select Other Controls

In addition to erosion and sediment controls, the pollution prevention plan for your project should address the other potential pollutant sources which may exist on a construction site They include. proper waste disposal, control of offsite vehicle tracking, compliance with applicable State or local waste disposal, sanitary sewer or septic system regulations, and control of allowable non-storm water discharges Chapter 4 describes how you can address each of these topics

2.3.3 Select Storm Water Management Controls

The final controls which should be addressed in the Storm Water Pollution Prevention Plan are storm water management controls Storm water management controls are constructed to prevent or control pollution of storm water after the construction *is* completed. These controls include retention ponds, detention ponds, infiltration measures, vegetated swales, and natural depressions.

As with erosion and sediment controls, your selection of the most appropriate storm water management measures is dependent upon a number of factors, but is most dependent on site conditions The information collected in the site evaluation, design and assessment steps is used to select controls

2.3.4 Indicate Location of Controls on the Site Map

Once the pollution prevention controls have been selected, they should be indicated on the site map Provide the location of each measure used for erosion and sediment control, storm water management and other controls Below is a list of typical BMPs which illustrate the kinds of controls which you should include on the site map

Erosion and Sediment Control

- Areas of permanent seeding
- Areas of sod stabilization
- Areas of geotextile stabilization
- Silt fence
- Straw bale barrier
- Earth dikes
- Brush barriers
- Drainage swales
- Sediment traps
- Pipe slope drains
- Level spreaders
- Storm drain-inlet protection
- Reinforced soil retaining systems
- Gabions
- Temporary or permanent sediment basins
- Stabilized construction entrances

Storm Water Management Controls

- Storm water detention structures (including wet ponds)
- Storm water retention structures
- Open vegetated swales
- Natural depressions
- Infiltration measures

The above list may not include every possible control measure If your plan includes a measure not on this list, you should still indicate it on the site map if possible It may not be feasible to indicate some controls on the site map, for example it would be very difficult to indicate appropriate waste control on the site map

Once you have indicated the controls on the site map, it may be necessary to revise the limit of disturbance and/or the drainage boundaries The limit of disturbance should be indicated outside of any perimeter control, because the construction of most controls does require some soil disturbance Drainage boundaries are often impacted by diversion structures This is because the intent of a diversion device is typically to divert runoff from one drainage basin to another. The drainage patterns on the site map should reflect the drainage patterns on the site while the controls are in place

Once the location of the controls are indicated, the site map is ready to be included in the pollution prevention plan. The table below summarizes the items which are typically required to be indicated on the Storm Water Pollution Prevention Plan site map.

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Storm Water Pollution Prevention Plan Site Plan Requirements Part IV.D.1.e.
The site map shall indicate: • Drainage patterns • Approximate slopes after grading • Area of soil disturbance • Location of major structural and nonstructural controls • Areas where stabilization practices are expected to occur • Location of surface waters.

2.3.5 Prepare Inspection and Maintenance Plan

Once the Storm Water Pollution Prevention Plan is put into effect, you will be responsible for inspecting and maintaining the controls you have proposed to prevent and control pollution of storm water on the construction site

It is important for you to plan for the inspection and maintenance of vegetation, erosion and sediment control measures and other protective measures which are part of this plan. These controls must be in good operating condition until the area they protect has been completely stabilized or the construction project is complete

It is recommended that you prepare an inspection and maintenance checklist which addresses each of the control measures proposed for the facility. A blank checklist for your facility could be included in the Storm Water Pollution Prevention Plan prior to starting construction. The inspector could complete a copy of the blank checklist during each inspection. The inspection and maintenance checklist should be prepared based upon the requirements for each individual measure For example, sediment must be removed from a silt trap when it has filled to one third of its depth. Consult your State/local manuals or Appendix C for maintenance requirements for control measures Appendix B contains a sample blank Inspection and Maintenance Checklist.

EPA BASELINE GENERAL PERMIT REQUIREMENTS

Maintenance and Inspection Requirements

Parts IV.D.3. and IV.D.4.

Pollution Prevention Plan shall include:

- **A description of procedures to maintain in good condition and effective operating condition**
  - **Vegetation**
  - **Erosion and sediment control measures**
  - **Other protective measures identified in the site plan**
- **Qualified personnel shall inspect disturbed areas of the construction site at least once every seven calendar days and within 24 hours of the end of a storm that is 0.5 inches or greater.**

2.3.6 Prepare a Description of Controls

Once you have finished planning your construction activities and selected the controls, make a list of each type of control you plan to use on the site. Include in this list a description of each control and what its purpose is and why it is appropriate in this location The description should also include specific information about the measure such as size, materials, and methods of construction. Read your permit carefully to ensure that your plan includes all of the required controls.

2.3.7 Coordinate Controls with Construction Activity

You also should prepare a sequence of major activities that lists all of the tasks required for: construction of control measures, earth disturbing construction activities, and maintenance activities for control measures in the order in which they will occur. Specific timing requirements for installation and maintenance of control measures are dependent upon the measures and/or the construction activities. Refer to Chapters 3, 4 and 5 for specific timing information on your site's controls There are, however, several general principles which you should keep in mind when developing the sequence of major activities These principals are:

1. Downslope and sideslope perimeter controls should be installed <u>before</u> the land disturbing activity occurs.
2. Do not disturb an area until it is necessary for construction to proceed.
3. Cover or stabilize as soon as possible.
4. Time activities to limit impact from seasonal climate changes or weather events.
5. Construction of infiltration measures should be delayed to the end of the construction project when upstream drainage areas have been stabilized.

6. Do not remove temporary perimeter controls until after all upstream areas are stabilized.

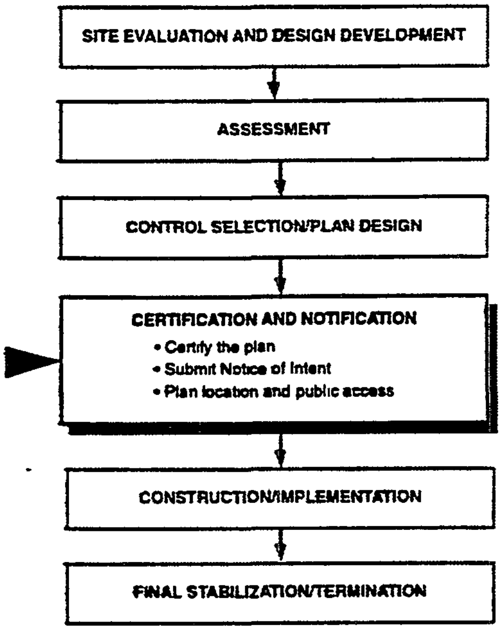
Appendix B contains a sample description of controls and sequence of major activities.

2.3.8 Incorporate State or Local Requirements

Construction operations are often subject to State or local sediment and erosion or storm water management program requirements in addition to any requirements in the site's NPDES storm water permit. It is very likely that these State and local requirements will overlap with your site's Storm Water Pollution Prevention Plan requirements. However, since not all localities have such programs, or the programs do not meet the standards set by your NPDES storm water permit, overlap may be limited. Therefore, because State and local programs can vary significantly from locality to locality, the Storm Water Pollution Prevention Plan components of an NPDES storm water permit ensure that a minimum level of pollution prevention is required. Where a construction site has taken measures to comply with State and local requirements, and these measures fulfill requirements of the Storm Water Pollution Prevention Plan conditions, the applicable measures may be incorporated into the plan.

The Permit may require that any State and local sediment and erosion control or storm water management requirements be incorporated by reference into the plan. This approach allows States and localities the flexibility to maintain their existing programs and provides additional authority for enforcement. Therefore, you should check the requirements of your permit to determine if you must include a copy of a sediment and erosion control and/or storm water management plan which is approved by a State or local authority.

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Permit Requirements for State/Local Plans **Part IV.D.2.d.(1).** Permittees shall incorporate all applicable requirements specified in State or local sediment and erosion control plans or permits, or storm water management plans or permits. The permittee must provide a certification that their Pollution Prevention Plan reflects these requirements, and permittees shall comply with these requirements during the term of the permit.



2.4 CERTIFICATION AND NOTIFICATION

Once the site description and controls portion of the Storm Water Pollution Prevention Plan have been prepared then you now can certify the pollution prevention plan. If you intend to be included under the general permit, then you should submit a notice of intent to the appropriate agency.

It is recommended that you read your permit carefully to evaluate whether or not all the required items are included in your Storm Water Pollution Prevention Plan prior to certifying the plan or submitting a Notice of Intent.

2.4.1 Certification

In order to ensure that your site's Storm Water Pollution Prevention Plan is completely developed and adequately implemented, your NPDES storm water permit will typically require that authorized representative(s) of the operator(s) sign and certify the plan The authorized representative(s) should be individuals at or near the top of the management chain, such as the president, vice president, or a general partner who has been delegated the authority to sign and certify this type of document. In signing the plan, the authorized representative(s) certifies that the information is true and assumes liability for the plan.

Official signatures provide a basis for an enforcement action to be taken against the person signing the document The permittee should be aware that Section 309 of the Clean Water Act provides for significant penalties where information is false or the permittee violates, either knowingly or negligently, its permit requirements Specific signatory requirements for the Storm Water Pollution Prevention Plan will be listed in your NPDES storm water permit.

EPA BASELINE GENERAL PERMIT REQUIREMENTS

Signature Requirements

Parts V.B. and VI.G.

All reports, certifications, or information either submitted to the Director or to the operator of a large or medium municipal separate storm sewer system, or required to be maintained by the permittee onsite shall be signed according to the following details:

Parts VI.G.1.a., b., and c.

- For a corporation, the plan must be signed by a "responsible corporate officer." A responsible corporate officer may be <u>any one of the following</u>:
  - 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
  - The manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25,000,000 (in second quarter 1980 dollars) if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedure.
- For a partnership or sole proprietorship, the plan must be signed by a general partner or the proprietor, respectively.
- For a municipality, State, Federal, or other public agency, the plan must be signed by either:
  - The principal executive officer or ranking official, which includes the chief executive officer of the agency, or
  - The senior officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional EPA Administrators).

Designating Signatory Authority

Parts VI.G.2.a., b., and c.

Any of the above persons may designate a duly authorized representative to sign for them. The representative may either be a particular individual or a particular named position. If an authorized representative is appointed, the authorization must be put in writing by the responsible signatory and submitted to the Director. Any change in an authorized individual or an authorized position must be made in writing and submitted to the Director.

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Reports/Documents Certification Requirements Part VI.G.2.d. Any person signing documents under 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 gathered and evaluated 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."

Construction activities typically have contractors or subcontractors who are responsible for implementing the controls specified in the plan, but may not have the authority to design or modify the plan. Many NPDES permits will require that these contractors certify that they understand the requirements of the permit and the plan.

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Requirements for Contractors and Subcontractors Parts IV.E.1. and IV.E.2. The site's Storm Water Pollution Prevention Plan shall provide a list of all contractors and subcontractors who will implement the measures identified in the plan. In addition, these contractors and subcontractors shall sign a certification statement and provide their names, addresses, and telephone numbers. These certifications shall be signed before the contractor begins activities and shall be filed with the site's Storm Water Pollution Prevention Plan. The following statement shall be signed in accordance with the signatory requirements described above. "I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification."

2.4.2 Notice of Intent

If you intend to include your project under a General Permit for Storm Water Discharges Associated With Industrial Activity from Construction Activities, then you are typically required to submit an NOI prior to commencement of construction. Consult your permit to determine the exact deadline for submitting an NOI. It should be noted that typically the NOI cannot be submitted until the Storm Water Pollution Prevention Plan has been prepared.

In cases where more than one party meets the definition of an "operator" of a construction activity (see Section 1.3 or consult your permit), all of those parties may need to submit an NOI and become co-permittee's.

EPA BASELINE GENERAL PERMIT REQUIREMENTS

Notice of Intent Requirements

Parts II.A.2 and II.B.

Individuals who intend to obtain coverage for storm water discharges from a construction site (where disturbances associated with the construction project begin after October 1, 1992) shall submit an NOI at least 2 days prior to the commencement of construction.

The NOI should include:

1. The mailing address of the construction site for which the notification is submitted. Where a mailing address for the site is not available, the location of the approximate center of the site must be described in terms of the latitude and longitude to the nearest 15 seconds, or the section, township and range to the nearest quarter;
2. The name, address and telephone number of the operator(s) with day to day operational control that have been identified at the time of the NOI submittal, and operator status as a Federal, State, private, public or other entity. Where multiple operators have been selected at the time of the initial NOI submittal, NOIs must be attached and submitted in the same envelope. When an additional operator submits an NOI for a site with a preexisting NPDES permit, the NOI for the additional operator must indicate the number for the preexisting NPDES permit;
3. The name of the receiving water(s), or if the discharge is through a municipal separate storm sewer, the name of the municipal operator of the storm sewer and the ultimate receiving water(s);
4. The number of any NPDES permit for any discharge (including non-storm water discharges) for the site that is currently authorized by an NPDES permit.
5. An indication of whether the facility has existing quantitative data describing the concentration of pollutants in the storm water discharge available (existing data should not be included as part of the NOI); and
6. An estimate of project start date and completion dates, estimates of the number of acres of the site on which soil will be disturbed, and a certification that a storm water pollution prevention plan has been prepared for the site in accordance with Part IV of this permit, and such plan provides compliance with approved State and/or local sediment and erosion plans or permits and/or storm water management plans or permits in accordance with Part IV.D.2.d of this permit. (A copy of the plans or permits should not be included with the NOI submission).

2.4.3 Plan Location and Public Access

Submittal Requirements/Plan Location

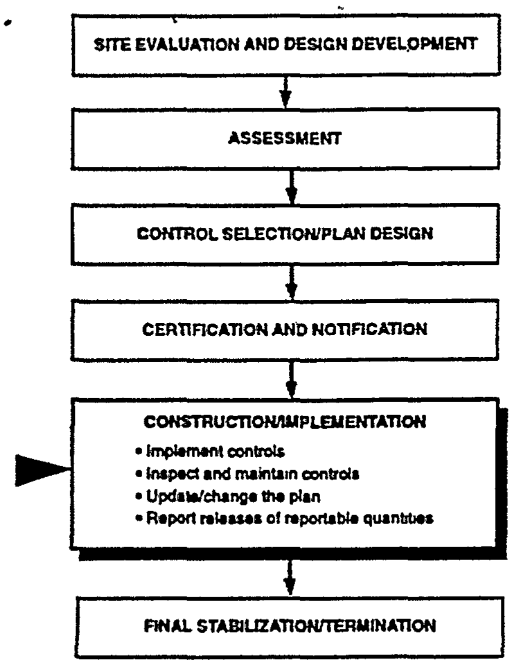
Some NPDES storm water permits for construction sites may require that Storm Water Pollution Prevention Plans be submitted to the Director for review, whereas other permits may only require that plans be maintained onsite. Permitting authorities may prefer not to require plans to be submitted to reduce the administrative burden of reviewing a large number of pollution prevention plans. However, when the Director requests the plan, permittees should submit it in a timely manner. In addition, when requested, permittees should also submit their plan to State or local sediment and erosion or storm water management agencies, or to a municipal operator where the site discharges through an NPDES storm water permitted municipal separate storm sewer system. Examine your permit carefully to determine what requirements apply to your facility regarding submitting plans.

Regardless of whether or not the Storm Water Pollution Prevention Plan should be submitted to the permitting authority or other public agency, site operators are expected to keep the plan and supporting materials at the site of the construction operations at all times throughout the project. In maintaining plans onsite, you should keep all records and supporting documents compiled together in an orderly fashion. Your permit may require that all records be maintained for a certain period of time after the project is completed. This provision ensures that all records are available in case a legal situation arises for which documentation is necessary.

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Submittal/Plan Location Requirements Parts IV.B. and V.A., B. Storm Water Pollution Prevention Plans for construction activities shall be maintained onsite of the activity unless the Director, or authorized representative, the operator of a large or medium municipal separate storm sewer system, or a State or local sediment and control agency requests that the plan be submitted. Permittees should keep a copy of the plan at the construction site until the site is finally stabilized. In addition, permittees are required to keep the plan, all reports and data for at least three years after the project is complete.

Public Access

Despite the fact that plans and associated records are not necessarily required to be submitted to the Director, these documents are considered to be "reports" according to Section 308(b) of the Clean Water Act, and therefore, are available to the public. Your permit may require you to provide copies of your plan to your permitting authority, municipal operator, or State or local agency upon request. However, permittees may claim certain portions of their Storm Water Pollution Prevention Plan as confidential according to the regulations at 40 CFR Part 2. Basically, these regulations state that records which contain trade secret information may be claimed as confidential.



2.5 CONSTRUCTION/IMPLEMENTATION

Once you have prepared a Storm Water Pollution Prevention Plan and filed a Notice of Intent, you may then start construction of the project. However, you are not finished meeting the requirements of your permit. You should now do the things which you said you would do in the Storm Water Pollution Prevention Plan.

2.5.1 Implement Controls

The first step you should take is to construct or perform the controls which were selected for the Storm Water Pollution Prevention Plan The controls should be constructed or applied in accordance with State or local standard specifications. If there are no State or local specifications for control measures then the controls should be constructed in accordance with good engineering practices. Appendix B of this manual lists typical design standards for structural control measures. The controls should be constructed and the stabilization measures applied in the order which you indicated in the sequence of major activities.

To ensure that controls are adequately implemented, it is important that the work crews which install the measures are experienced and/or adequately trained. Improperly installed controls can have little or no effect and may actually increase the pollution of storm water.

It is also important that all other workers on the construction site be made aware of the controls so that they do not inadvertently disturb or remove them.

2.5.2 Inspect and Maintain Controls

Inspection and maintenance of the control measures is as important to pollution prevention as proper planning and design Chapter 5 describes in further detail the inspection and maintenance activities which should be performed Inspection should be performed at the frequency specified in the Storm Water Pollution Prevention Plan and/or the permit The inspector should note any damage or deficiencies in the control measures in an inspection report The operator should correct damage or deficiencies as soon as practicable after the inspection, and any changes that may be required to correct deficiencies in the Storm Water Pollution Prevention Plan should be made as soon as practicable after the inspection.

2.5.3 Maintain Records of Construction Activities

In addition to the inspection and maintenance reports, the operator should keep records of the construction activity on the site. In particular, the operator should keep a record of:

- The dates when major grading activities occur in a particular area
- The dates when construction activities cease in an area, temporarily or permanently
- The dates when an area is stabilized.

You can use these records to make sure that areas where there is no construction activity will be stabilized within the required timeframe

2.5.4 Changing the Plan

In order for a construction activity to be in full compliance with its NPDES storm water permit, and in order for the Storm Water Pollution Prevention Plan to be effective, the plan should be consistent with permit conditions, and the plan should accurately reflect site features and operations. Should either of these conditions not be met by the plan, the plan should be changed.

If, at any time during the effective period of the permit, the permitting authority finds that the plan does not meet one or more of the minimum standards established by the pollution prevention plan requirements, the permitting authority will notify the permittee of required changes necessary to bring the plan up to standard

Storm Water Pollution Prevention Plans are developed based on site-specific features and functions. Where there are changes in design, construction, operation, or maintenance, and that change will have a significant effect on the potential for discharging pollutants in storm water at a site, the Storm Water Pollution Prevention Plan should be modified by the permittee to reflect the changes and new conditions For example, a change in the construction schedule or design specifications should be incorporated in the Storm Water Pollution Prevention Plan. Another situation in which the plan should be modified is where the plan proves to be ineffective in controlling pollutants. This determination could be made based on the results of regular visual inspections (see Chapter 5)

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Requirements for Storm Water Pollution Prevention Plan Changes Parts IV.B.3. and IV.C. Any changes required by the permitting authority shall be made within 7 days of the notification or an individual application should be submitted, unless otherwise provided by the notification. The permittee should submit a certification to the permitting authority that the requested changes have been made. The Storm Water Pollution Prevention Plan requirements also specify that the permittee to update the plan as necessary to reflect any changes onsite which may affect the potential for discharges of pollutants from the site.

2.5.5 Releases of Reportable Quantities

Because construction activities may handle certain hazardous substances over the course of the project, spills of these substances in amounts that equal or exceed Reportable Quantity (RQ) levels are a possibility. EPA has issued regulations which define what reportable quantity levels are for oil and hazardous substances. These regulations are found at 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302 (see Appendix F for a complete list). For oil, if you detect an oily sheen in your storm water runoff, then you have exceeded the reportable quantity level. For hazardous substances, the RQ levels depend on the chemical For example, for dieldrin, a pesticide, the level is 1 kilogram (kg). If you spill or otherwise release one or more kg of dieldrin, then you have exceeded the RQ threshold. Spill events such as these can be avoided if your site's Storm Water Pollution Prevention Plan addresses this possibility. Chapter 5 discusses spill prevention and control. To do this, your permit may require a description of potential spill areas in your site description or a description of specific procedures to respond to and clean up a spill. Another possibility would be for your permit to establish a RQ release as a trigger for more stringent requirements, such as a requirement to submit an individual application

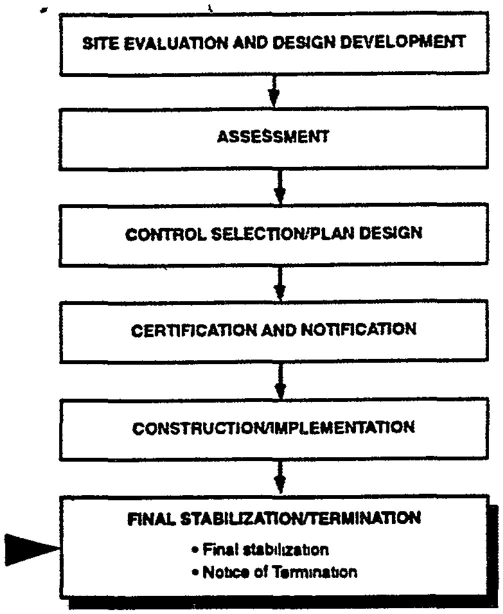
EPA BASELINE GENERAL PERMIT REQUIREMENTS

Requirements for Reporting Spills

Part III.B.

If the construction site has a release of a hazardous substance or of oil in an amount which exceeds a reportable quantity (RQ) as defined at 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302 (see Appendix F for a complete list), then the permittee shall do several things:

- The person in charge of the site at the time of the spill shall call the National Response Center to report the spill (800-424-8802, or 202-426-2675);
- Within 14 days after the release is detected, modify the site Storm Water Pollution Prevention Plan. The modification shall include: a description of the release; the date of the release; an explanation of why the spill happened, a description of procedures to prevent future spills and/or releases from happening; and a description of response procedures should a spill or release occur again; and
- Within 14 days of the release, submit a written description of the release including: a description of the release, including the type of material and an estimated amount of spill; the date of the release; an explanation of why the spill happened; and a description of the steps taken to prevent and control future releases.



2.6 FINAL STABILIZATION/ TERMINATION

Your permit for discharge of storm water associated with a construction activity may remain in effect until the discharge is eliminated. This does not mean when the storm water discharge is eliminated but that the construction is completed.

Typically, the storm water discharge associated with an industrial activity is eliminated when the site is finally stabilized. When storm water discharge associated with an industrial activity ceases, the permit may allow the owner/operator of the facility to cease coverage by submitting a Notice of Termination.

2.6.1 Final Stabilization

As soon as practicable after construction activities have been completed in a disturbed area, permanent stabilization should be started to prevent further erosion of soil from that area. All disturbed areas of a site (except those portions which are covered by pavement or a structure) should be finally stabilized once all construction activities are completed Final stabilization requirements may vary from permit to permit Read your permit to determine exactly what constitutes final stabilization

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Final Stabilization Requirements Part IX. A site can be considered finally stabilized when all soil disturbing activities at the site have been completed and a uniform perennial vegetative cover with a density of 70 percent for the unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures have been employed.

2.6.2 Notice of Termination

The Notice of Termination is typically the final task required to comply with the requirements of an NPDES storm water permit for a construction activity The Notice of Termination communicates to the permit enforcement agency that the construction activity has ceased and the area is stabilized. Your permit may list the requirements for Notice of Termination Check the permit to see what information is required and when it may be submitted

EPA BASELINE GENERAL PERMIT REQUIREMENTS

Notice of Termination Requirements

Part VIII.A.

Notice of Termination shall include:

1. The mailing address of the construction site for which the notification is submitted. Where a mailing address for the site is not available, the location of the approximate center of the site must be described in terms of the latitude and longitude to the nearest 15 seconds, or the section, township and range to the nearest quarter;

2. The name, address and telephone number of the operator addressed by the Notice of Termination;

3. The NPDES permit number for the storm water discharge identified by the Notice of Termination;

4. An indication of whether the storm water discharges associated with industrial activity have been eliminated or the operator of the discharges has changed; and

5. The following certification signed in accordance with Part VI.G. (signatory requirements) of this permit:

   "I certify under penalty of law that all storm water discharges associated with industrial activity from the identified facility that are authorized by an NPDES general permit have been eliminated or that I am no longer the operator of the construction activity. I understand that by submitting this notice of termination, that I am no longer authorized to discharge storm water associated with industrial activity under this general permit, and that discharging pollutants in storm water associated with industrial activity to waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by an NPDES permit. I also understand that the submittal of this notice of termination does not release an operator from liability for any violations of this permit or the Clean Water Act."

For the purposes of this certification, elimination of storm water discharges associated with industrial activity means that all disturbed soils at the identified facility have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time, or that all storm water discharges associated with construction activities from the identified site that are authorized by a NPDES general permit have otherwise been eliminated.

2.7 SUMMARY

This chapter has tried to describe the components of an effective Storm Water Pollution Prevention Plan for construction activities. The process of developing and implementing a Storm Water Pollution Prevention Plan has been described on a step-by-step basis in the order that the plan should be assembled. Table 2.2 summarizes the components of a Storm Water Pollution Prevention Plan and indicates where these components are described.

TABLE 2.2 SUMMARY OF STORM WATER POLLUTION PREVENTION PLAN COMPONENTS FOR CONSTRUCTION ACTIVITIES

Component	See Section:	Further Information Available In
a. SITE DESCRIPTION		
(1) Description of the nature of construction activity	2 1.2	
(2) Estimate of total area of the site and of the area expected to be disturbed	2.2.1	
(3) Runoff coefficient	2.2.3	
(4) Site map including		
• Drainage patterns	2 1 1	
• Approximate slopes	2.1 3	
• Area of soil disturbance	2.1 3	
• Location of structural and nonstructural controls	2.3 4	Chapters 3, 4, and 5
• Location of stabilization practices	2 3 4	Chapter 3
• Surface waters (Type)	2 1 1	
(5) Receiving waters (Name)	2 1 1	
b. DESCRIPTION OF CONTROLS		
Sequence of major activities	2 3 6	
Timing for each control measure	2 3 6	Chapters 3, 4, and 5
(1) Erosion and Sediment Controls		Chapter 3
(a) Description of Stabilization Practices	2 3 1 and 2 3 6	Chapter 3
(b) Description of Structural Practices	2 3 1 and 2 3 6	Chapter 3
(2) Storm water management	2 3 2 and 2.3.6	
(3) Other controls	2.3 3 and 2 3 6	Chapter 4
(4) Approved State or local plans	2 3 7	Chapter 3
(5) Description of maintenance	2 3.5	Chapter 5
(6) Inspectors		
(b) Changes to the plan	2.5.3	
(c) Inspection reports	2.5 2 and 2 3 5	Chapter 5
5. Non-Storm Water Discharges		
Description of controls for non-storm water discharges	2 3 6	Chapter 5
6 Industrial activities onsite	2 1.3	
7. Contractors		
Certification	2 4 1	

CHAPTER 3

SEDIMENT AND EROSION CONTROL

Soil erosion and sediment controls are measures which are used to reduce the amount of soil particles that are carried off of a land area and deposited in a receiving water. Soil erosion and sediment control is not a new technology The USDA Soil Conservation Service and a number of State and local agencies have been developing and promoting the use of erosion and sediment control devices for years

This chapter provides a general description of some of the most commonly used measures today and a method to select the most appropriate measures for your project The descriptions contained in this chapter are very simple and are intended to provide general understanding rather than specific design information. You are encouraged to consult your State or local guidance books for sediment and erosion control measure design standards You are also encouraged to consult the design fact sheets contained in Appendix B of this manual

3.1 SELECTION OF SOIL EROSION AND SEDIMENT CONTROL PRACTICES

Your selection of the best soil erosion and sediment controls for your site should be primarily based upon the nature of the construction activity and the conditions which exist at the construction site.

The soil erosion and sediment control portion of the Storm Water Pollution Prevention Plan should:

- Minimize the amount of disturbed soil
- Prevent runoff from offsite areas from flowing across disturbed areas
- Slow down the runoff flowing across the site
- Remove sediment from onsite runoff before it leaves the site
- Meet or exceed local or State requirements for sediment and erosion control plans.

Your soil erosion and sediment control plan should meet each of the objectives listed above. How you meet these objectives depends primarily on the nature of the construction activity and the characteristics of the site The following subsections are presented in a question and answer format The questions concern certain characteristics of your construction site Your answer to each of these questions will help you determine what sediment and erosion control practices are best suited for your construction project

Appendix A includes an Erosion and Sediment Control Checklist This checklist can be used in your review of the erosion and sediment control portion of your Pollution Prevention Plan to evaluate compliance with typical storm water construction permit requirements You should also review your projects.

The major problem associated with erosion at construction sites is the movement of soil off the site and its impact on water quality. Construction site erosion is a source of sediments, toxicants, and nutrients which pollute the receiving water(s) Clearing, grading, or otherwise altering previously undisturbed land at a construction site increases the erosion rate by as much as 1,000 times the pre-construction rate. Millions of tons of sediment are generated annually by the construction industry in the United States alone, and erosion rates, typically 100 to 200 tons per acre, have been reported as high as 500 tons per acre (State of North Carolina, 1988).

Q. What is Erosion?

Erosion, by the action of water, wind, and ice, is a natural process in which soil and rock material is loosened and removed. There are two major classifications of erosion (1) geological erosion, and (2) man-made erosion

Geological erosion, which includes soil-forming as well as soil-removing, has contributed to the formation of soils and their distribution on the surface of the earth Man-made erosion, which can greatly accelerate the natural erosion process, includes the breakdown of soil aggregates and the increased removal of organic and mineral particles; it is caused by clearing, grading, or otherwise altering the land. Erosion of soils that occurs at construction sites is man-made erosion.

Factors Influencing Erosion by Water

Erosion of the land surface may be caused by water, wind, ice, or other geological agents. Water erosion, which is the focus of this document, is the loosening and removal of soil from the land by running water, including runoff from melted snow and ice The major factors affecting soil erosion are soil characteristics, climate, rainfall intensity and duration, vegetation or other surface cover, and topography.

Understanding the factors that effect erosion makes it possible to predict the extent and consequences of onsite erosion

3.1.1 Minimize the Amount of Disturbed Soil

Why?

Minimizing the amount of disturbed soil on the construction site will decrease the amount of soil which erodes from the site, and it can decrease the amount of controls you have to construct to remove the sediment from the runoff

Q. How does disturbing soil cause erosion?

Disturbing soil can remove the vegetation Vegetation is the most effective way to control erosion. Vegetative covers reduce erosion by: (1) shielding the soil surface from the impact of falling rain and thus reducing runoff, (2) dispersing and decreasing the velocity of surface flow, (3) physically restraining soil movement, (4) increasing infiltration rates by improving the soil's structure and porosity through the incorporation of roots and plant residues; and (5) conducting transpiration, which decreases soil moisture content and increases soil moisture storage capacity Figure 3.1 illustrates some of the ways that vegetation helps control erosion.

Nonvegetative covers such as mulches and stone aggregates similarly protect soils from erosion. Like vegetative covers, these ground covers shield the soil surface from the impact of falling rain, reduce flow velocity, and disperse flow. Each of these types of cover provides a rough surface that slows the runoff velocity and promotes infiltration and deposition of sediment. The condition as well as the type of ground cover influences the rate and volume of runoff. It should be noted that although impervious surfaces (such as parking lots) protect the covered area, they prevent infiltration and consequently increase the peak flow rate which increases the potential for erosion at the discharge area

Q. Did you develop a site plan that does not require a significant amount of grade changes?

A construction project site should be selected and laid out so that it fits into existing land contours. When you try to significantly change the grades in an area you can increase the amount of disturbed soil which increases the amount of erosion which will occur. Significant regrading can also disturb the natural drainage of an area, and can be more costly.

Q. Are there portions of the site which will not have to be cleared for construction to proceed?

Only clear and grub the portions of the site where it is necessary for construction. When less area is disturbed for construction, there is less erosion of soil Natural vegetation can also improve the aesthetics of the site See page 3-24 Preservation of Natural Vegetation for further discussion on this BMP.

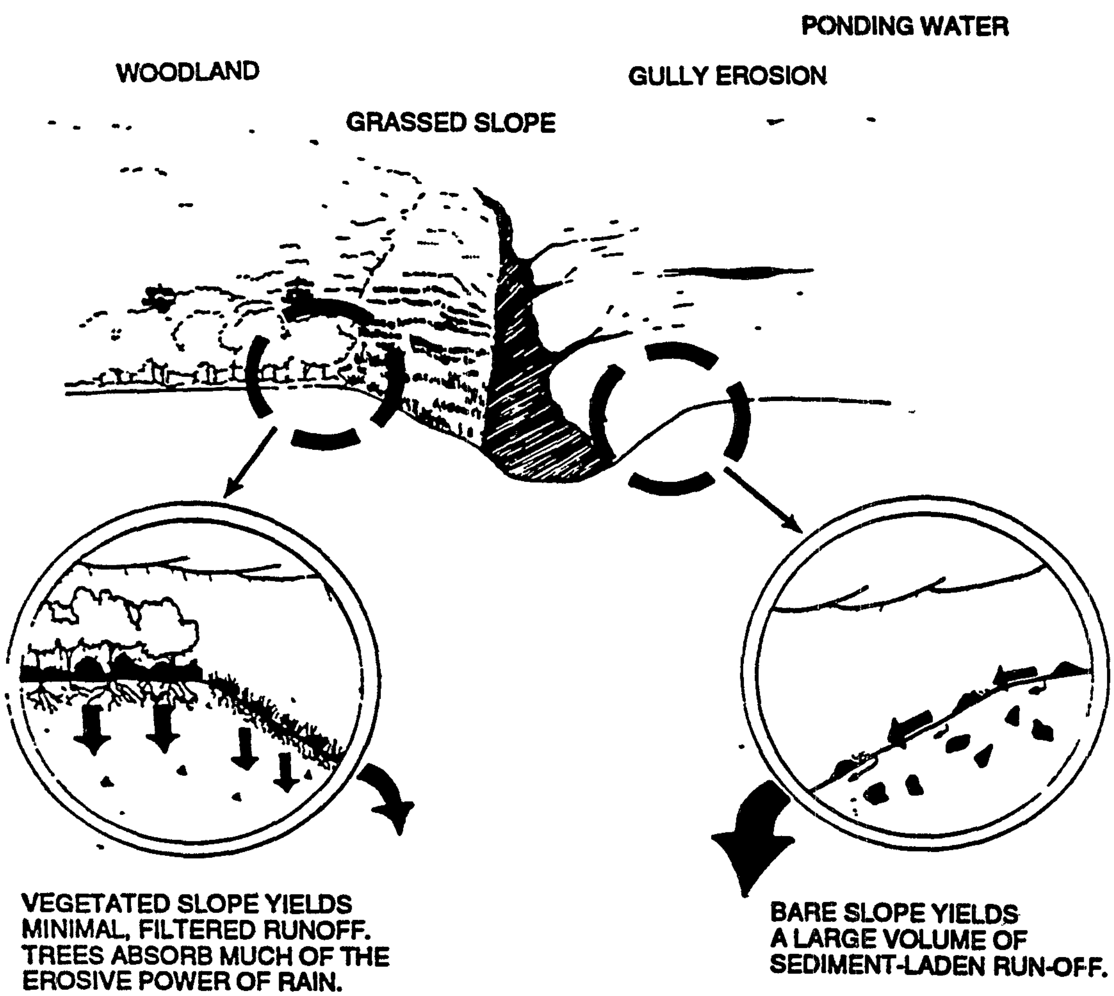


FIGURE 3.1 EROSION PREVENTION BY STABILIZATION
(From State of North Carolina, 1988)

Q. Can the construction be performed in stages, so that the entire site does not have to be cleared at one time?

If your construction project will take place over a wide spread area, consider staging the project so that only a small portion of the site will be disturbed at any one time For example, if you were developing a 100-acre housing subdivision, rather than clear the entire 100 acres at the start of construction, only clear a 20-acre parcel, grade the area, install the utilities, pave the roads, construct the houses, landscape and seed the lawn areas, then move on to the next 20-acre parcel. Phased construction helps to lessen the risk of erosion by minimizing the amount of disturbed soil that is exposed at any one time

Q. Are there portions of the site which will be disturbed then left alone for long periods of time?

If there are disturbed portions of the site that will not be re-disturbed for a long period (check your permit to see what the maximum time is), then these areas should be stabilized with Temporary Seeding (see page 3-14) or Mulching (see page 3-16) This will reduce the amount of erosion from these areas until they are disturbed again For example, if soil excavated from a temporary sediment trap is stockpiled to be used later to backfill the trap (when the area is stabilized) then the stockpile should be stabilized with temporary seed

Q. Do you stabilize all disturbed areas after construction is complete?

By permanently stabilizing the disturbed areas as soon as possible after construction is complete in those areas, you can significantly reduce the amount of sediment which should be trapped before it leaves your site An area can be stabilized by Permanent Seeding and Planting (see page 3-20), Mulching (see page 3-16), Geotextiles (see page 3-17), and Sod Stabilization (see page 3-26).

Q Does snow prevent you from seeding an area?

If snow cover prevents you from seeding a disturbed area or planting other types of vegetation, then you should wait until the snow melts before stabilizing the area.

Q. Is there not enough rainfall to allow vegetation to grow on your construction site.

If there is not enough rainfall on the area you have disturbed to allow vegetation to grow then you should,

- Seed and irrigate the disturbed area (if allowed by your permit-see non storm-water flows) or,
- Stabilize the disturbed areas by non vegetative methods (See Mulching (page 3-16), Geotextiles (page 3-17), or Chemical Stabilization (page 3-19)

3.1.2 Prevent Runoff From Offsite Areas From Flowing Across Disturbed Areas

Why?

Diverting offsite runoff around a disturbed area reduces the amount of storm water which comes into contact with the exposed soils. If there is less runoff coming in contact with exposed soil, then there will be less erosion of the soil and less storm water which has to be treated to remove sediment.

Q. Does runoff from undisturbed uphill areas flow onto your construction site?

Overland flow can be diverted around a construction site by installing an Earth Dike (see page 3-37), an Interceptor Dike and Swale (see page 3-41), or a Drainage Swale (see page 3-39). Your choice of diversion methods depends upon the size of the uphill area and the steepness of the slope the diversion must go down. Interceptor dikes and swales are effective in diverting overland flows from smaller areas (3 acres or less) down gentle slopes (10 percent or less) A temporary swale is most effective diverting runoff from concentrated channels and an earth dike is capable of diverting both sheet and concentrated flows from larger areas down steeper slopes (See Appendix B for specific design information regarding each of these diversion measures.) These devices should be installed from the uphill side of the site down to a point where they can discharge to an undisturbed area on the downhill side of the site.

Q. Will runoff flow down a steeply sloped, disturbed area on the site?

Steeply sloped areas are especially susceptible to erosion. If there are steep areas on your site which will be disturbed, then an Earth Dike (page 3-37) or Interceptor Dike and Swale (page 3-41) may be used to divert the runoff from the top of the slope to the inlet of a Pipe Slope Drain (page 3-48) or to a less steeply sloped area These measures will minimize the amount of runoff flowing across the face of a slope and decrease the erosion of that slope

Q. Is there a swale or stream which runs through your construction site?

Swales and streams which run through construction sites must be protected from erosion and sediment because they can be significantly damaged. Streams and other water bodies should be protected by Preservation of Natural Vegetation (see page 3-24) or Buffer Zones (see page 3-22). Where possible, these techniques should also be used to protect swales or intermittent streams.

Where construction requires that the stream or swale be disturbed, then the amount of area and time of disturbance should be kept at a minimum All stream and channel crossings should be made at right angles to the stream, preferably at the most narrow portion of the channel Once a stream or swale is disturbed, construction should proceed as quickly as possible in this area Once completed, the stream banks should be stabilized with Stream Bank Stabilization (see page 3-28), Gabions. Swales and intermittent streams disturbed by construction should be seeded and stabilized with Geotextiles (see page 3-17) as soon as possible

Q. Does construction traffic have to cross a drainage swale or stream?

If it is necessary to cross a swale or stream to get to all or parts of your construction site, then before you begin working on the opposite side of the stream, you should construct a Temporary Stream Crossing (see page 3-43). Stream crossings can be either permanent or temporary depending upon the need to cross the stream after construction is complete.

3.1.3 Slow Down the Runoff Traveling Across the Site

Why?

The quantity and size of the soil particles that are loosened and removed increase with the velocity of the runoff. This is because high runoff velocities reduce infiltration into the soil (and therefore also increase runoff volume) and exert greater forces on the soil particles causing them to detach. It is no surprise, therefore, that high flow velocities are associated with severe rill and gully erosion.

Q. Is your site gently sloped?

When preparing the grading plan, try to make grades as gradual as possible without modifying the existing site conditions significantly. Steeper slopes result in faster moving runoff, which results in greater erosion. Erosion can occur on even the gentlest of slopes depending on soil and climate conditions. The State/local representative of the Soil Conservation Service is a good source of area-specific considerations. (The USDA defines slopes of 2 to 9 percent as gently sloping; slopes of 9 to 15 percent are considered moderately steep, slopes of 30 to 50 percent are considered to be steep slopes; and slopes greater than 50 percent are considered very steep slopes.)

Q. Are there steeply sloped areas on your site?

Steeply sloped areas can be protected from erosion in a number of ways Section 3.1.2 describes how flow can be diverted away from the face of the slope, however, this technique does not address runoff from the slope itself Gradient Terraces (see page 3-70) should be used to break the slope and slow the speed of the runoff flowing down the hillside. Surface Roughening (see page 3-67) can also be used on sloped areas as a method to slow down overland flow on a steep slope.

Q. Is your site stabilized with vegetation?

In addition to holding soil in place and shielding it from the impact of rain drops, vegetative cover also increases the roughness of the surface runoff flows over The rougher surface slows the runoff. An area can be stabilized by Permanent Seeding (see page 3-20), Mulching (see page 3-16), Geotextiles (see page 3-17), and Sod Stabilization (see page 3-26).

Q. Does runoff concentrate into drainage swales on your site?

Concentrated runoff can be more erosive than overland flow Runoff concentrated into swales or channels can be slowed by reducing the slope and increasing the width of a channel. When site conditions prevent decreasing the slope and widening a channel, then runoff can be slowed with Check Dams (see page 3-65). Runoff can also be slowed in channels by establishing a vegetative cover. Geotextiles (see page 3-17) are often used to hold the channel soil in place while the grass is growing

3.1.4 Remove Sediment From Onsite Runoff Before It Leaves the Site

Why?

Despite the many advances in meteorology, it is not possible to predict more than a few days in advance when it will rain. It takes several weeks to establish a grass cover which can effectively control erosion, and, even if there were advanced warning of rainfall, it is not always possible to halt construction activities in an area to allow grass to grow. Therefore, it is necessary on most construction sites to install measures which can remove sediment from runoff before it flows off of the construction site.

Q. Does your construction disturb an area 10 acres or larger that drains to a common location?

The sediment control device which is most suitable for large disturbed areas is the Sediment Basin (see page 3-60) A sediment basin should be installed at all locations where there is an upstream disturbed area of 10 acres or more. Only if a sediment basin is not attainable should other sediment controls be installed A sediment basin may not be attainable at a location if.

- Shallow bedrock prevents excavation of a basin
- Topography in the common drainage location prohibits the construction of a basin of adequate storage volume
- There is insufficient space available at the common drainage location to construct a basin, due to the presence of existing structures, pavement, or utilities which cannot be relocated
- The only common drainage location is beyond the property line or "right of way" of the construction activity and a temporary construction easement cannot be obtained
- State, local, or other Federal regulations prohibit a basin or the construction of a basin in the common drainage locations

Q. Does your construction disturb an area less than 10 acres that drains to a common location?

Disturbed areas less than 10 acres in size have more variety in the measures which are suitable for sediment control Several types of measures can be used for sediment control including: Sediment Basins, Sediment Trap, Silt Fence, and Gravel Filter Berms The selection among these measures depends upon a number of criteria The following questions should help you determine which is the most appropriate

Q. What if a sediment basin is not attainable on a site where there are 10 or more disturbed acres which drain to a common location?

If you cannot install a sediment basin on your site, then you should install Sediment Traps (see page 3-58), Silt Fences (see page 3-52), or other equivalent sediment control measures such as Gravel Filter Berms (see page 3-54).

Q. Does runoff leave the disturbed area as overland flow?

Sediment can be removed from overland flow using filtration controls such as Silt Fences (see page 3-52) and Gravel Filter Berms (see page 3-54). These methods have limitations (which are described in Section 3.2.2) regarding the specific conditions in which they are effective.

Overland flow runoff from a disturbed area can also be directed to a Sediment Trap (see page 3-58) or a Temporary Sediment Basin (see page 3-60) using diversion devices such as an Earth Dike (see page 3-37) or an Interceptor Dike and Swale (see page 3-41).

Q. Is flow concentrated in channels as it leaves the disturbed area?

Sediment should be removed from concentrated runoff by either a Sediment Trap (see page 3-58) or a Temporary Sediment Basin (see page 3-60) depending upon the disturbed area upstream. Filtration measures are generally not effective when used in concentrated flow because flow will back-up behind the filter until it overtops it.

Q. Are structural controls located along the entire downhill perimeter of all disturbed areas?

Runoff which passes over disturbed soil should pass through sediment controls before it can be allowed to flow off of the construction site. Therefore the entire downslope and side slope borders of the disturbed area should be lined with filtration devices, such as silt fence, or with a diversion device which will carry the runoff to a sediment basin or sediment trap prior to discharging it off site

Q. Is there a piped storm drain system with inlets in a disturbed area?

If there is a yard drain or curb inlet which receives flow from a disturbed area then a Sediment Basin, Sediment Trap, or Inlet Protection should be constructed to remove the sediment from the runoff before it flows into the inlet

3.1.5 Meet or Exceed Local/State Requirements for Erosion and Sediment Control

Why?

Many State and local authorities also have sediment and erosion control regulations in place. It is important that these requirements still be met. The NPDES storm water permit your construction project may be required to obtain for storm water is not intended to supersede State or local requirements It is intended to provide another means to regulate storm water.

Q. Does your State or local government require erosion and sediment control for construction projects?

Consult State or local authorities to determine what, if any, requirements there are for sediment and erosion control on construction projects Many State and local authorities provide their own design manuals or guidance to assist in preparing a plan which meets their requirements. These State and local requirements should be incorporated into the pollution prevention plan.

If the State or local authority requires review and approval of the sediment and erosion control plan, then a reviewed and approved copy of that plan should be included in the pollution prevention plan.

Q. Does your State or local government have an erosion and sediment control requirement which is different from the requirements of your NPDES storm water permit?

Although most of the provisions of the NPDES storm water permits for construction activities are consistent with most State and local requirements, there may be differences in the specific requirements for control measures When there is a difference in requirements, you should use the more stringent one For example, your State may only require you to stabilize a disturbed area within 30 days of the last disturbance, however, the your permit may require you to stabilize an area 14 days after the last disturbance Under this example, you would be required to stabilize after 14 days

3.2 SEDIMENT AND EROSION CONTROL PRACTICES

Any site where soils are exposed to water, wind or ice can have soil erosion and sedimentation problems. Erosion is a natural process in which soil and rock material is loosened and removed. Sedimentation occurs when soil particles are suspended in surface runoff or wind and are deposited in streams and other water bodies

Human activities can accelerate erosion by removing vegetation, compacting or disturbing the soil, changing natural drainage patterns, and by covering the ground with impermeable surfaces (pavement, concrete, buildings). When the land surface is developed or "hardened" in this manner, storm water and snowmelt can not seep into or "infiltrate" the ground. This results in larger amounts of water moving more quickly across a site which can carry more sediment and other pollutants to streams and rivers.

The following sections describe stabilization practices and structural practices for erosion and sediment control. Using the measures to control erosion and sedimentation is an important part of storm water pollution prevention These measures are well established and have been required by a number of State and local agencies for years

3.2.1 Stabilization Practices

Preserving existing vegetation or revegetating disturbed soil as soon as possible after construction is the most effective way to control erosion A vegetation cover reduces erosion potential in four ways: (1) by shielding the soil surface from the direct erosive impact of raindrops, (2) by improving the soil's water storage porosity and capacity so more water can infiltrate into the ground; (3) by slowing the runoff and allowing the sediment to drop out or deposit, and (4) by physically holding the soil in place with plant roots

Vegetative cover can be grass, trees, or shrubs Grasses are the most common type of cover used for revegetation because they grow quickly, providing erosion protection within days. Other soil stabilization practices such as straw or mulch may be used during non-growing seasons to prevent erosion. Newly planted shrubs and trees establish root systems more slowly, so keeping existing ones is a more effective practice

Vegetative and other site stabilization practices can be either temporary or permanent controls. Temporary controls provide a cover for exposed or disturbed areas for short periods of time or until permanent erosion controls are put in place Permanent vegetative practices are used when activities that disturb the soil are completed or when erosion is occurring on a site that is otherwise stabilized.

EPA BASELINE GENERAL PERMIT REQUIREMENTS

Stabilization Requirements

Part IV.D.2.a.(1).

Except as provided in paragraphs IV.D.2.(a).(1).(a), (b), and (c) below, stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

(a). Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.

(b). Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g. the total time period that construction activity is temporarily ceased is less than 21 days) then stabilization measures do not have to be initiated on that portion of site by the 14th day after construction activity temporarily ceased.

(c). In arid areas (areas with an average annual rainfall of 0-10 inches) and semi-arid areas (areas with an average annual rainfall of 10-20 inches), where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.

The remainder of this section describes the common vegetative practices listed below:

- Temporary Seeding
- Mulching
- Geotextiles
- Chemical Stabilization
- Permanent Seeding and Planting
- Buffer Zones
- Preservation of Natural Vegetation
- Sod Stabilization
- Stream Bank Stabilization
- Soil Retaining Measures
- Dust Control.

Temporary Seeding

What Is It

Temporary seeding means growing a short-term vegetative cover (plants) on disturbed site areas that may be in danger of erosion. The purpose of temporary seeding is to reduce erosion and sedimentation by stabilizing disturbed areas that will not be stabilized for long periods of time or where permanent plant growth is not necessary or appropriate. This practice uses fast-growing grasses whose root systems hold down the soils so that they are less apt to be carried offsite by storm water runoff or wind. Temporary seeding also reduces the problems associated with mud and dust from bare soil surfaces during construction.

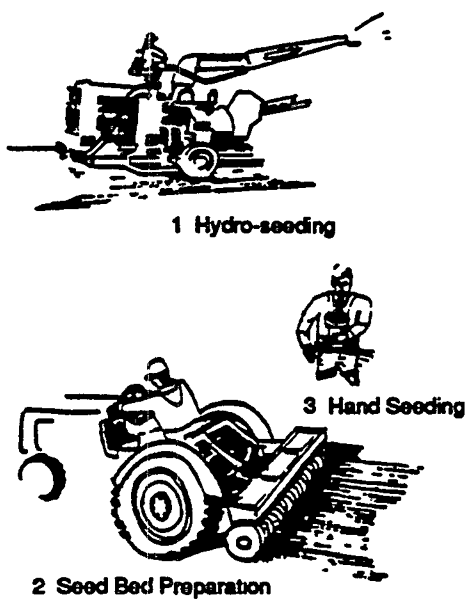


FIGURE 3.2 SEEDING PRACTICES
(Modified from Washington State, 1992)

When and Where to Use It

Temporary seeding should be performed on areas which have been disturbed by construction and which are likely to be redisturbed, but not for several weeks or more. Typical areas might include denuded areas, soil stockpiles, dikes, dams, sides of sediment basins, and temporary roadbanks. Temporary seeding should take place as soon as practicable after the last land disturbing activity in an area. Check the requirements of your permit for the maximum amount of time allowed between the last disturbance of an area and temporary stabilization. Temporary seeding may not be an effective practice in arid and semi-arid regions where the climate prevents fast plant growth, particularly during the dry seasons. In those areas, mulching or chemical stabilization may be better for the short-term (see sections on Mulching, Geotextiles, and Chemical Stabilization).

What to Consider

Proper seed bed preparation and the use of high-quality seed are needed to grow plants for effective erosion control Soil that has been compacted by heavy traffic or machinery may need to be loosened. Successful growth usually requires that the soil be tilled before the seed is applied. Topsoiling is not necessary for temporary seeding, however, it may improve the chances of establishing temporary vegetation in an area Seed bed preparation may also require applying fertilizer and/or lime to the soil to make conditions more suitable for plant growth Proper fertilizer, seeding mixtures, and seeding rates vary depending on the location of the site, soil types, slopes, and season. Local suppliers, State and local regulatory agencies, and the USDA Soil Conservation Service will supply information on the best seed mixes and soil conditioning methods.

Seeded areas should be covered with mulch to provide protection from the weather. Seeding on slopes of 2.1 or more, in adverse soil conditions, during excessively hot or dry weather, or where heavy rain is expected should be followed by spreading mulch (see section on Mulching) Frequent inspections are necessary to check that conditions for growth are good. If the plants do not grow quickly or thick enough to prevent erosion, the area should be reseeded as soon as possible Seeded areas should be kept adequately moist If normal rainfall will not be enough, mulching, matting, and controlled watering should be done If seeded areas are watered, watering rates should be watched so that over-irrigation (which can cause erosion itself) does not occur.

Advantages of Temporary Seeding

- Is generally inexpensive and easy to do
- Establishes plant cover fast when conditions are good
- Stabilizes soils well, is aesthetic, and can provide sedimentation controls for other site areas
- May help reduce costs of maintenance on other erosion controls (e g , sediment basins may need to be cleaned out less often)

Disadvantages of Temporary Seeding

- Depends heavily on the season and rainfall rate for success
- May require extensive fertilizing of plants grown on some soils, which can cause problems with local water quality
- Requires protection from heavy use, once seeded
- May produce vegetation that requires irrigation and maintenance

Mulching

What Is It

Mulching is a temporary soil stabilization or erosion control practice where materials such as grass, hay, woodchips, wood fibers, straw, or gravel are placed on the soil surface. In addition to stabilizing soils, mulching can reduce the speed of storm water runoff over an area. When used together with seeding or planting, mulching can aid in plant growth by holding the seeds, fertilizers, and topsoil in place, by helping to retain moisture, and by insulating against extreme temperatures.

When and Where to Use It

Mulching is often used alone in areas where temporary seeding cannot be used because of the season or climate Mulching can provide immediate, effective, and inexpensive erosion control. On steep slopes and critical areas such as waterways, mulch matting is used with netting or anchoring to hold it in place.

Mulch seeded and planted areas where slopes are steeper than 2:1, where runoff is flowing across the area, or when seedlings need protection from bad weather.

What to Consider

Use of mulch may or may not require a binder, netting, or the tacking of mulch to the ground. Final grading is not necessary before mulching Mulched areas should be inspected often to find where mulched material has been loosened or removed. Such areas should be reseeded (if necessary) and the mulch cover replaced immediately. Mulch binders should be applied at rates recommended by the manufacturer.

Advantages of Mulching
• Provides immediate protection to soils that are exposed and that are subject to heavy erosion • Retains moisture, which may minimize the need for watering • Requires no removal because of natural deterioration of mulching and matting
Disadvantages of Mulching
• May delay germination of some seeds because cover reduces the soil surface temperature • Mulch can be easily blown or washed away by runoff if not secured • Some mulch materials such as wood chips may absorb nutrients necessary for plant growth

Geotextiles

What Are They

Geotextiles are porous fabrics known in the construction industry as filter fabrics, road rugs, synthetic fabrics, construction fabrics, or simply fabrics. Geotextiles are manufactured by weaving or bonding fibers made from synthetic materials such as polypropelene, polyester, polyethylene, nylon, polyvinyl chloride, glass and various mixtures of these As a synthetic construction material, geotextiles are used for a variety of purposes in the United States and foreign countries The uses of geotextiles include separators, reinforcement, filtration and drainage, and erosion control. We will discuss the use of geotextiles in preventing erosion at construction sites in this section

Some geotextiles are also biodegradable materials such as mulch matting and netting Mulch mattings are materials (jute or other wood fibers) that have been formed into sheets of mulch that are more stable than normal mulch Netting is typically made from jute, other wood fiber, plastic, paper, or cotton and can be used to hold the mulching and matting to the ground. Netting can also be used alone to stabilize soils while the plants are growing, however, it does not retain moisture or temperature well Mulch binders (either asphalt or synthetic) are sometimes used instead of netting to hold loose mulches together.

When and Where to Use Them

Geotextiles can be used for erosion control by using it alone Geotextiles, when used alone, can be used as matting Mattings are used to stabilize the flow on channels and swales Also, matting is used on recently planted slopes to protect seedlings until they become established. Also, matting may be used on tidal or stream banks where moving water is likely to wash out new plantings

Geotextiles are also used as separators An example of such a use is geotextile as a separator between riprap and soil This "sandwiching" prevents the soil from being eroded from beneath the riprap and maintaining the riprap's base.

What to Consider

As stated above, the types of geotextiles available are vast, therefore, the selected fabric should match its purpose Also, State or local requirements, design procedures, and any other applicable requirements should also be consulted In the field, important concerns include regular inspections to determine if cracks, tears, or breaches are present in the fabric and appropriate repairs should be made

Effective netting and matting require firm, continuous contact between the materials and the soil. If there is no contact, the material will not hold the soil and erosion will occur underneath the material

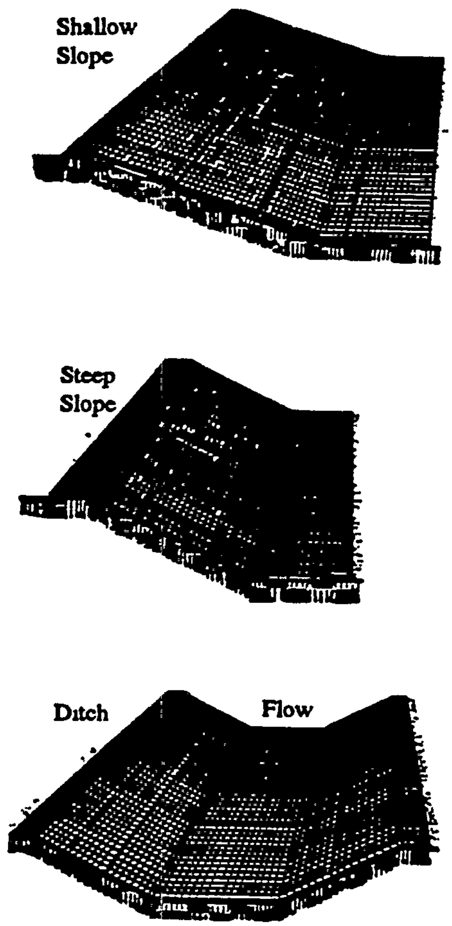


FIGURE 3.3 ORIENTATION OF MULCH NETTING AND MATTING (Modified from County of Fairfax, 1987)

Advantages of Geotextiles
• Fabrics are relatively inexpensive for certain applications • Offer convenience to the installer • Design methodologies for the use of geotextiles are available • A wide variety of geotextiles to match specific needs are available • Mulch matting and netting are biodegradable
Disadvantages of Geotextiles
• If the fabric is not properly selected, designed, or installed, the effectiveness may be reduced drastically • Many synthetic geotextiles are sensitive to light and must be protected prior to installation

Chemical Stabilization

What Is It

Chemical stabilization practices, often referred to as a chemical mulch, soil binder, or soil palliative, are temporary erosion control practices. Materials made of vinyl, asphalt, or rubber are sprayed onto the surface of the soil to hold the soil in place and protect against erosion from storm water runoff and wind Many of the products used for chemical stabilization are human-made, and many different products are on the market

When and Where to Use It

Chemical stabilization can be used as an alternative in areas where temporary seeding practices cannot be used because of the season or climate It can provide immediate, effective, and inexpensive erosion control anywhere erosion is occurring on a site.

What to Consider

The application rates and procedures recommended by the manufacturer of a chemical stabilization product should be followed as closely as possible to prevent the products from forming ponds and from creating large areas where moisture cannot get through

Advantages of Chemical Stabilization
• Is easily applied to the surface of the soil • Is effective in stabilizing areas where plants will not grow • Provides immediate protection to soils that are in danger of erosion
Disadvantages of Chemical Stabilization
• Can create impervious surfaces (where water cannot get through), which may in turn increase the amount and speed of storm water runoff • May cause harmful effects on water quality if not used correctly • Is usually more expensive than vegetative cover

Permanent Seeding and Planting

What Is It

Permanent seeding of grass and planting trees and brush provides stabilization to the soil by holding soil particles in place. Vegetation reduces sediments and runoff to downstream areas by slowing the velocity of runoff and permitting greater infiltration of the runoff. Vegetation also filters sediments, helps the soil absorb water, improves wildlife habitats, and enhances the aesthetics of a site.

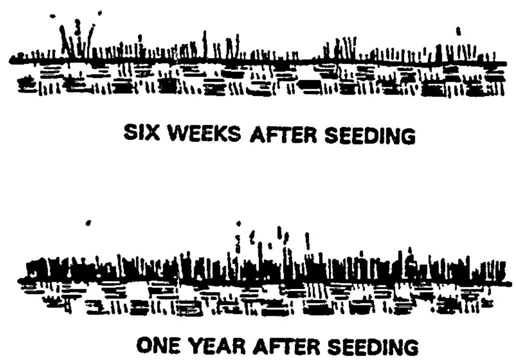


FIGURE 3.4 ESTABLISHING PERMANENT COVER WITH VEGETATION
(Modified from State of North Carolina, 1988)

When and Where to Use It

Permanent seeding and planting is appropriate for any graded or cleared area where long-lived plant cover is desired. Some areas where permanent seeding is especially important are filter strips, buffer areas, vegetated swales, steep slopes, and stream banks. This practice is effective on areas where soils are unstable because of their texture, structure, a high water table, high winds, or high slope.

What to Consider

For this practice to work, it is important to select appropriate vegetation, prepare a good seedbed, properly time planting, and to condition the soil Planting local plants during their regular growing season will increase the chances for success and may lessen the need for watering. Check seeded areas frequently for proper watering and growth conditions.

When seeding in cold climates during fall or winter, cover the area with mulch to provide a protective barrier against cold weather (see Mulching) Seeding should also be mulched if the seeded area slopes 4:1 or more, if soil is sandy or clayey, or if weather is excessively hot or dry.

Plant when conditions are most favorable for growth When possible, use low-maintenance local plant species

Topsoil should be used on areas where topsoils have been removed, where the soils are dense or impermeable, or where mulching and fertilizers alone cannot improve soil quality Topsoiling should be coordinated with the seeding and planting practices and should not be planned while the ground is frozen or too wet. Topsoil layers should be at least 2 inches deep (or similar to the existing topsoil depth)

To minimize erosion and sedimentation, remove as little existing topsoil as possible. All site controls should be in place before the topsoil is removed. If topsoils are brought in from another site, it is important that its texture is compatible with the subsoils onsite; for example, sandy topsoils are not compatible with clay subsoils

Stockpiling of topsoils onsite requires good planning so soils will not obstruct other operations. If soil is to be stockpiled, consider using temporary seeding, mulching, or silt fencing to prevent or control erosion Inspect the stockpiles frequently for erosion After topsoil has been spread, inspect it regularly, and reseed or replace areas that have eroded.

Advantages of Permanent Seeding and Planting
• Improves the aesthetics of a site • Provides excellent stabilization • Provides filtering of sediments • Provides wildlife habitat • Is relatively inexpensive
Disadvantages of Permanent Seeding and Planting
• May require irrigation to establish vegetation • Depends initially on climate and weather for success

Buffer Zones

What Are They

Buffer zones are vegetated strips of land used for temporary or permanent water quality benefits Buffer zones are used to decrease the velocity of storm water runoff, which in turn helps to prevent soil erosion. Buffer zones are different from vegetated filter strips (see section on Vegetated Filter Strips) because buffer zone effectiveness is not measured by its ability to improve infiltration (allow water to go into the ground). The buffer zone can be an area of vegetation that is left undisturbed during construction, or it can be newly planted

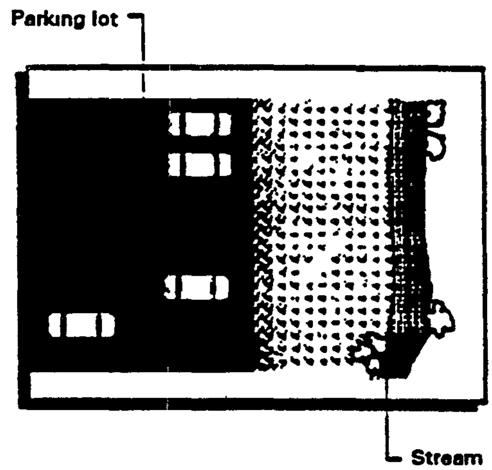


FIGURE 3.5 EXAMPLE BUFFER ZONE
(Modified from Washington State, 1992)

When and Where to Use Them

Buffer zones technique can be used at any site that can support vegetation. Buffer zones are particularly effective on floodplains, next to wetlands, along stream banks, and on steep, unstable slopes.

What to Consider

If buffer zones are preserved, existing vegetation, good planning, and site management are needed to protect against disturbances such as grade changes, excavation, damage from equipment, and other activities. Establishing new buffer strips requires the establishment of a good dense turf, trees, and shrubs (see Permanent Seeding and Planting) Careful maintenance is important to ensure healthy vegetation The need for routine maintenance such as mowing, fertilizing, liming, irrigating, pruning, and weed and pest control will depend on the species of plants and trees involved, soil types, and climatic conditions. Maintaining planted areas may require debris removal and protection against unintended uses or traffic. Many State/local storm water program or zoning agencies have regulations which define required or allowable buffer zones especially near sensitive areas such as wetlands. Contact the appropriate State/local agencies for their requirements.

Advantages of Buffer Zones
• Provide aesthetic as well as water quality benefits • Provide areas for infiltration, which reduces amount and speed of storm water runoff • Provide areas for wildlife habitat • Provide areas for recreation • Provide buffers and screens for onsite noise if trees or large bushes are used • Low maintenance requirements • Low cost when using existing vegetation
Disadvantages of Buffer Zones
• May not be cost effective to use if the cost of land is high • Are not feasible if land is not available • Require plant growth before they are effective

Preservation of Natural Vegetation

What Is It

The preservation of natural vegetation (existing trees, vines, brushes, and grasses) provides natural buffer zones. By preserving stabilized areas, it minimizes erosion potential, protects water quality, and provides aesthetic benefits This practice is used as a permanent control measure.

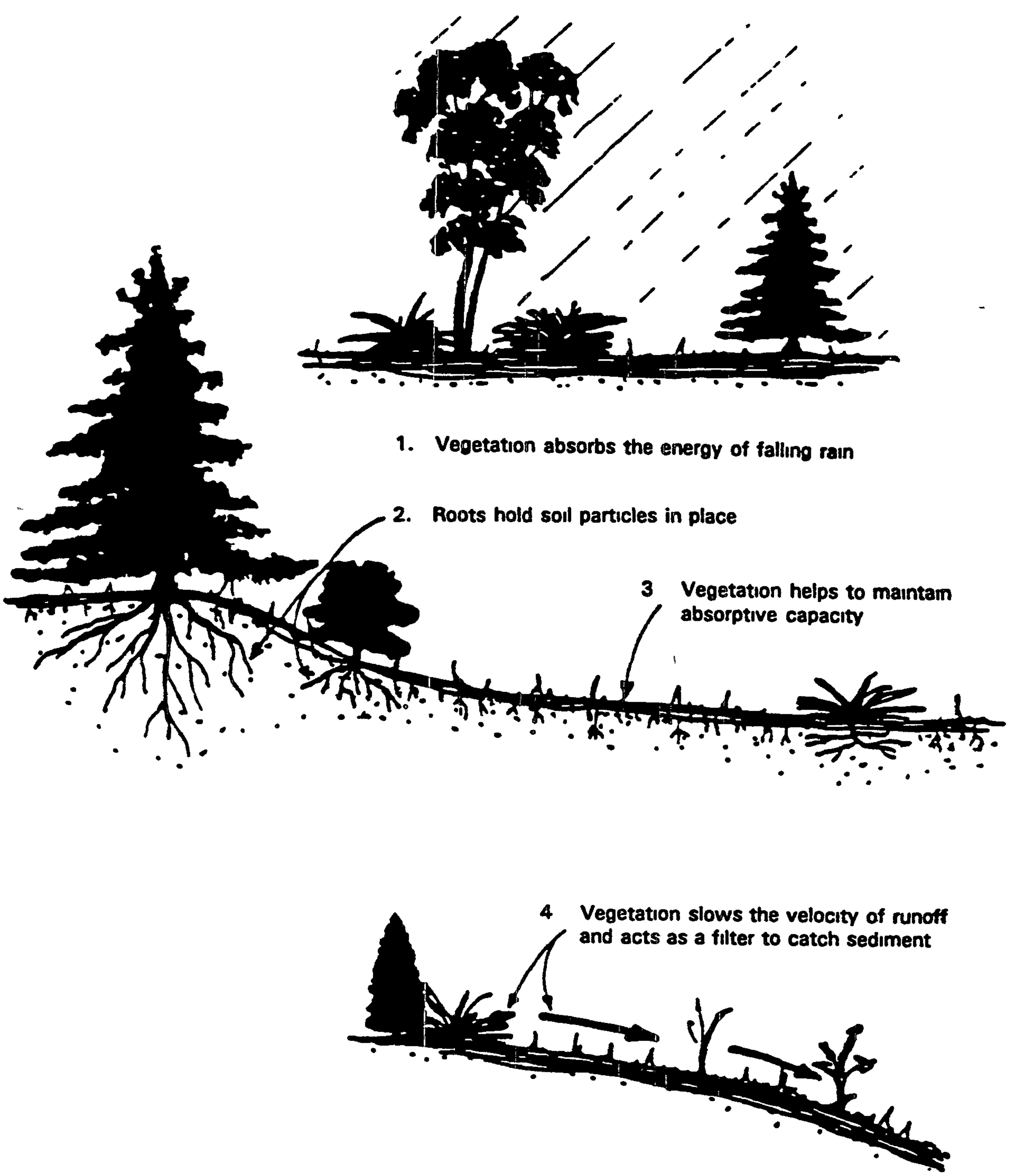
When and Where to Use It

This technique is applicable to all types of sites. Areas where preserving vegetation can be particularly beneficial are floodplains, wetlands, stream banks, steep slopes, and other areas where erosion controls would be difficult to establish, install, or maintain.

What to Consider

Preservation of vegetation on a site should be planned before any site disturbance begins. Preservation requires good site management to minimize the impact of construction activities on existing vegetation. Clearly mark the trees to be preserved and protect them from ground disturbances around the base of the tree. Proper maintenance is important to ensure healthy vegetation that can control erosion. Different species, soil types, and climatic conditions will require different maintenance activities such as mowing, fertilizing, liming, irrigation, pruning, and weed and pest control. Some State/local regulations require natural vegetation to be preserved in sensitive areas; consult the appropriate State/local agencies for more information on their regulations. Maintenance should be performed regularly, especially during construction.

Advantages of Preservation of Natural Vegetation
• Can handle higher quantities of storm water runoff than newly seeded areas • Does not require time to establish (i.e., effective immediately) • Increases the filtering capacity because the vegetation and root structure are usually denser in preserved natural vegetation than in newly seeded or base areas • Enhances aesthetics • Provides areas for infiltration, reducing the quantity and velocity of storm water runoff • Allows areas where wildlife can remain undisturbed • Provides noise buffers and screens for onsite operations • Usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation
Disadvantages of Preservation of Natural Vegetation
• Requires planning to preserve and maintain the existing vegetation • May not be cost effective with high land costs • May constrict area available for construction activities



Construction Operations Relative to Location of Protected Trees

FIGURE 3.6 BENEFITS OF PRESERVING NATURAL VEGETATION (Modified from Washington State, 1992)

Sod Stabilization

What Is It

Sodding stabilizes an area by immediately covering the surface with vegetation and providing areas where storm water can infiltrate into the ground

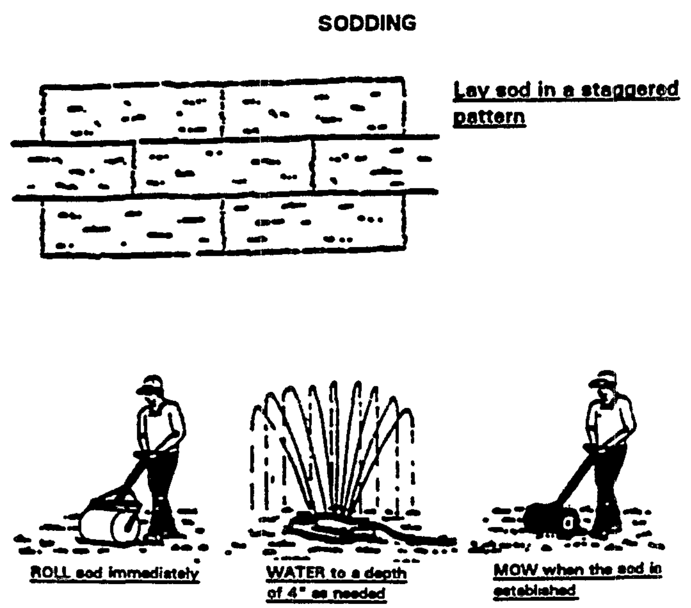


FIGURE 3.7 SODDING
(Modification from County of Fairfax, 1987)

When and Where to Use It

Sodding is appropriate for any graded or cleared area that might erode and where a permanent, long-lived plant cover is needed immediately. Examples of where sodding can be used are buffer zones, stream banks, dikes, swales, slopes, outlets, level spreaders, and filter strips.

What to Consider

The soil surface should be fine-graded before laying down the sod Topsoil may be needed in areas where the soil textures are inadequate (see topsoil discussion in section on Permanent Seeding and Planting). Lime and fertilizers should be added to the soil to promote good growth conditions. Sodding can be applied in alternating strips or other patterns, or alternate areas can be seeded to reduce expense. Sod should not be planted during very hot or wet weather. Sod should not be placed on slopes that are greater than 3:1 if they are to be mowed If placed on steep slopes, sod should be laid with staggered joints and/or be pegged In areas such as steep slopes or next to unning waterways, chicken wire, jute, or other netting can be placed over the sod for extra protection against lifting (see Mulching and Geotextiles). Roll or compact immediately after installation to ensure firm contact with the underlying topsoil. Inspect the sod frequently after it is irst installed, especially after large storm events, until it is established as permanent cover. Remove and replace dead sod Watering may be necessary after planting and during periods of intense heat and/or lack of rain (drought).

Advantages of Sod Stabilization
• Can provide immediate vegetative cover and erosion control
• Provides more stabilizing protection than initial seeding through dense cover formed by sod
• Produces lower weed growth than seeded vegetation
• Can be used for site activities within a shorter time than can seeded vegetation
• Can be placed at any time of the year as long as moisture conditions in the soil are favorable
Disadvantages of Sod Stabilization
• Purchase and installation costs are higher than for seeding
• May require continued irrigation if the sod is placed during dry seasons or on sandy soils

Stream Bank Stabilization

What Is It

Stream bank stabilization is used to prevent stream bank erosion from high velocities and quantities of storm water runoff. Typical methods include the following:

- Riprap–Large angular stones placed along the stream bank or lake
- Gabion–Rock-filled wire cages that are used to create a new stream bank
- Reinforced Concrete–Concrete bulkheads and retaining walls that replace natural stream banks and create a nonerosive surface
- Log Cribbing–Retaining walls built of logs to anchor the soils against erosive forces. Usually built on the outside of stream bends
- Grid Pavers–Precast or poured-in-place concrete units that are placed along stream banks to stabilize the stream bank and create open spaces where vegetation can be established
- Asphalt–Asphalt paving that is placed along the natural stream bank to create a nonerosive surface.

When and Where to Use It

Stream bank stabilization is used where vegetative stabilization practices are not practical and where the stream banks are subject to heavy erosion from increased flows or disturbance during construction. Stabilization should occur before any land development in the watershed area. Stabilization can also be retrofitted when erosion of a stream bank occurs.

What to Consider

Stream bank stabilization structures should be planned and designed by a professional engineer licensed in the State where the site is located Applicable Federal, State, and local requirements should be followed, including Clean Water Act Section 404 regulations. An important design feature of stream bank stabilization methods is the foundation of the structure; the potential for the stream to erode the sides and bottom of the channel should be considered to make sure the stabilization measure will be supported properly. Structures can be designed to protect and improve natural wildlife habitats; for example, log structures and grid pavers can be designed to keep vegetation Only pressure-treated wood should be used in log structures. Permanent structures should be designed to handle expected flood conditions. A well-designed layer of stone can be used in many ways and in many locations to control erosion and sedimentation. Riprap protects soil from erosion and is often used on steep slopes built with fill materials that are subject to harsh weather or seepage. Riprap can also be used for flow channel liners, inlet and outlet protection at culverts, stream bank protection, and protection of shore lines subject to wave action. It is used where water is turbulent and fast flowing and where soil may erode under the design flow conditions. It is used to expose the water to air as well as to reduce water energy. Riprap and gabion (wire mesh cages filled with rock) are usually placed over a filter blanket (i.e., a gravel layer or filter cloth). Riprap is either a uniform size or graded (different sizes) and is usually applied in an even layer throughout the stream Reinforced concrete structures may require positive

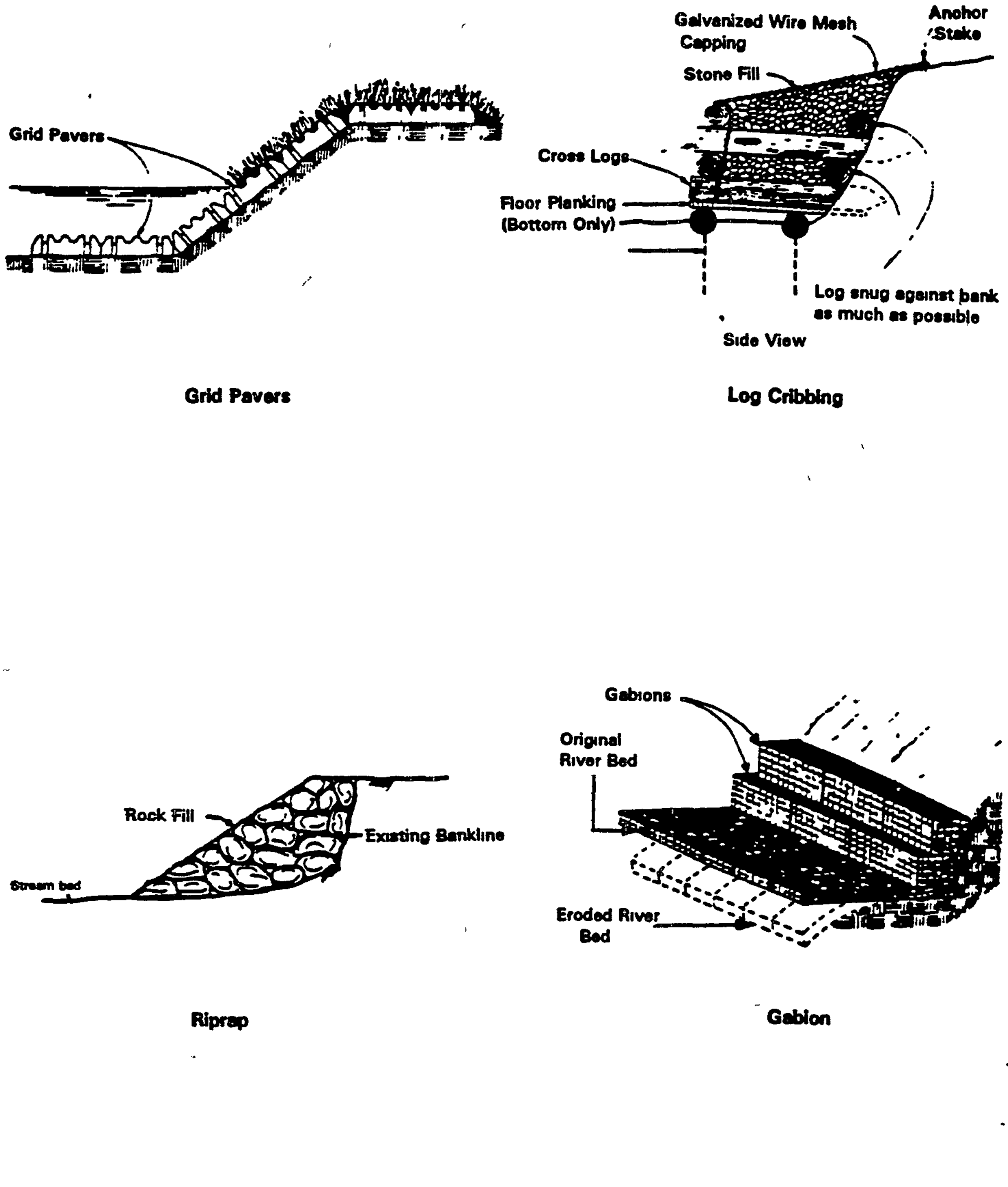


FIGURE 3.8 EXAMPLES OF STREAM BANK STABILIZATION PRACTICES
(Modified from Commonwealth of Virginia, 1980, and Commonwealth of Pennsylvania, 1990)

drainage behind the bulkhead or retaining wall to prevent erosion around the structure. Gabion and grid pavers should be installed according to manufacturers' recommendations.

Stream bank stabilization structures should be inspected regularly and after each large storm event. Structures should be maintained as installed. Structural damage should be repaired as soon as possible to prevent further damage or erosion to the stream bank.

Advantages of Stream Bank Stabilization
• Can provide control against erosive forces caused by the increase in storm water flows created during land development • Usually will not require as much maintenance as vegetative erosion controls • May provide wildlife habitats • Forms a dense, flexible, self-healing cover that will adapt well to uneven surfaces (riprap)
Disadvantages of Stream Bank Stabilization
• Does not provide the water quality or aesthetic benefits that vegetative practices could • Should be designed by qualified professional engineers, which may increase project costs • May be expensive (materials costs) • May require additional permits for structure • May alter stream dynamics which cause changes in the channel downstream • May cause negative impacts to wildlife habitats

Soil Retaining Measures

What Are They

Soil retaining measures refer to structures or vegetative stabilization practices used to hold the soil firmly to its original place or to confine as much as possible within the site boundary. There are many different methods for retaining soil; some are used to control erosion while others are used to protect the safety of the workers (i.e., during excavations). Examples of soil retaining measures include reinforced soil retaining systems, wind breaks, and stream bank protection using shrubs and reeds.

Reinforced soil retaining measures refer to using structural measures to hold in place loose or unstable soil. During excavation, for example, soil tiebacks and retaining walls are used to prevent cave-ins and accidents But these same methods can be used to retain soils and prevent them from moving While detailed discussion of soil retaining methods is beyond the scope of this manual, several are briefly described

- **Skeleton Sheeting**—Skeleton sheeting, the least expensive soil bracing system, requires the soil to be cohesive (i e., like clay). Construction grade lumber is used to brace the excavated face of the slope

- **Continuous Sheeting**—Continuous sheeting involves using a material that covers the face of the slope in a continuous manner Struts and boards are placed along the slope which provide continuous support to the slope face The material used can be steel, concrete, or wood

- **Permanent Retaining Walls**—Permanent construction walls may be necessary to provide support to the slope well after the construction is complete. In this instance, concrete masonry or wood (railroad tie) retaining walls can be constructed and left in place

When and Where to Use Them

Use reinforced soil retaining methods where using other methods of soil retention (e.g., vegetation) is not practical Some sites may have slopes or soils that do not lend themselves to ordinary practices of soil retention In these instances, a reinforced soil retaining measure should be considered.

What to Consider

As emphasized earlier, the use of reinforced soil retaining practices serve both safety and erosion control purposes Since safety is the first concern, the design should be performed by qualified and certified engineers. Such design normally involves understanding the nature of soil, location of the ground water table, the expected loads, and other important design considerations

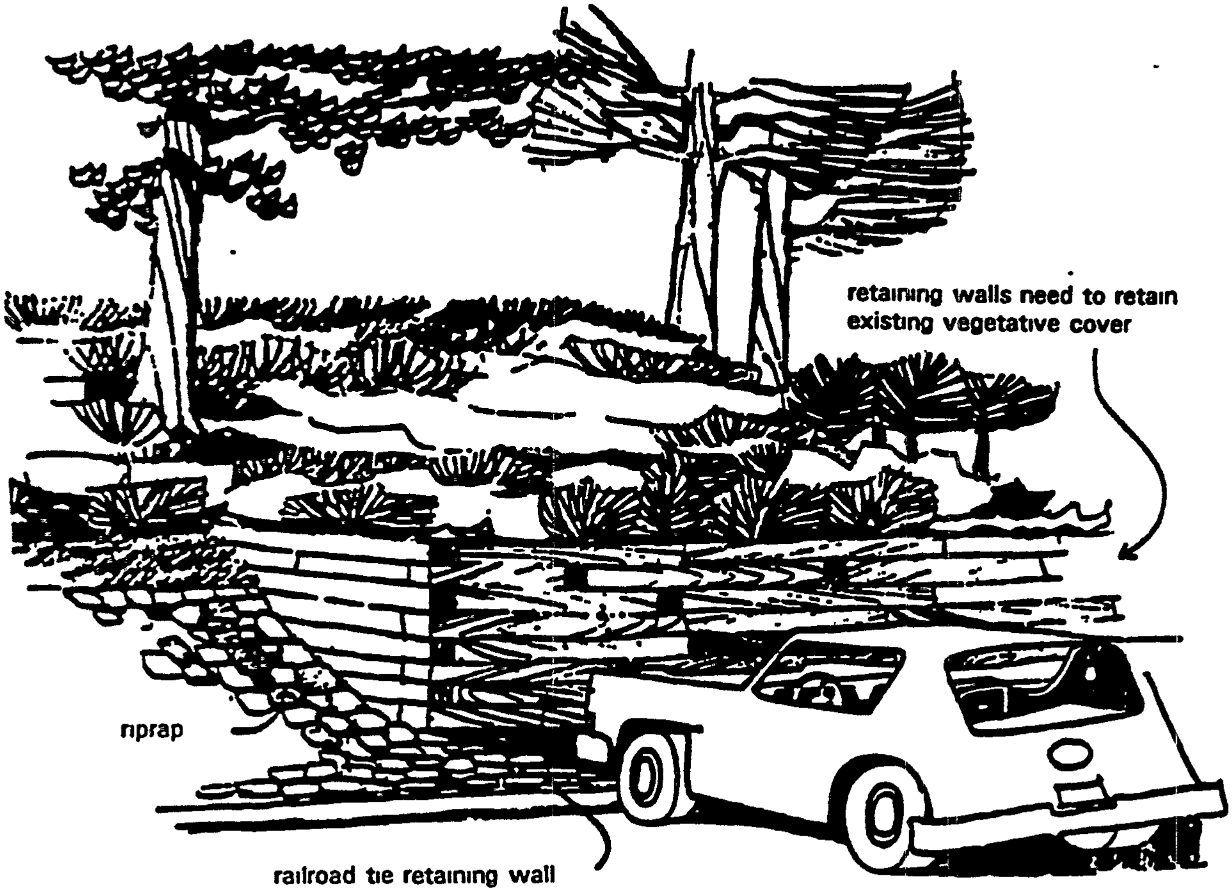


FIGURE 3.9 USE OF RETAINING WALLS
(Modification from Washington State, 1992)

Advantages of Soil Retaining Measures
• Provide safety to workers, and some types of reinforced retention can be left as permanent structures • Prevent erosion of soil difficult to stabilize using conventional methods
Disadvantages of Soil Retaining Measures
• Require the expertise of a professional engineer and may be expensive to design and install

Dust Control

What Is It

Wind is capable of causing erosion, particularly in dry climates or during the dry season. Wind erosion can occur wherever the surface soil is loose and dry, vegetation is sparse or absent, and the wind is sufficiently strong. Wind erodes soils and transports the sediments offsite, where they may be washed into the receiving water by the next rainstorm. Therefore, various methods of dust control may need to be employed to prevent dust from being carried away from the construction site. There are many ways to accomplish this and some are described below:

- **Vegetative Cover**—For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see Temporary Seeding and Permanent Seeding and Planting)

- **Mulch (Including Gravel Mulch)**—When properly applied, mulch offers a fast, effective means of controlling dust (see Mulching)

- **Spray-on Adhesive**—Asphalt emulsions, latex emulsions, or resin in water can be sprayed onto mineral soil to prevent their blowing away (see Chemical Stabilization).

- **Calcium Chloride**—Calcium chloride may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage.

- **Sprinkling**—The site may be sprinkled until the surface is wet. Sprinkling is especially effective for dust control on haul roads and other traffic routes

- **Stone**—Used to stabilize construction roads, can also be effective for dust control.

- **Barriers**—A board fence, wind fence, sediment fence, or similar barrier can control air currents and blowing soil All of these fences are normally constructed of wood and they prevent erosion by obstructing the wind near the ground and preventing the soil from blowing offsite

  Barriers can be part of long-term dust control strategy in arid and semiarid areas; however, they are not a substitute for permanent stabilization. A wind barrier generally protects soil downward for a distance of 10 times the height of the barrier. Perennial grass and stands of existing trees may also serve as wind barriers.

When and Where to Use It

The above measures for dust control should be used when open dry areas of soil are anticipated on the site. Clearing and grading activities create the opportunity for large amounts of dust to be blown, therefore, one or several dust control measures should be considered prior to clearing and grading. One should also note that many of the water erosion control measures indirectly prevent wind erosion

As the distance across bare soil increases, wind erosion becomes more and more severe In arid and semiarid regions where rainfall is insufficient to establish vegetative cover, mulching may be

used to conserve moisture, prevent surface crusting, reduce runoff and erosion, and help establish vegetation. It is a critical treatment on sites with erosive slopes.

What to Consider

The direction of the prevailing winds and careful planning of clearing activities are important considerations. As a standard practice, any exposed area should be stabilized using vegetation to prevent both wind and water erosion. If your site is located in an arid or semiarid area, you may wish to contact the USDA Soil Conservation Service representative in your area or the appropriate State/local government agency for additional information.

Advantages of Dust Control
• Reduces movement of soil to offsite areas
Disadvantages of Dust Control
• Excessive sprinkling may result in non-storm water discharges from the site

3.2.2 Structural Erosion and Sediment Control Practices

Structural practices used in sediment and erosion control divert storm water flows away from exposed areas, convey runoff, prevent sediments from moving offsite, and can also reduce the erosive forces of runoff waters. The controls can either be used as permanent or temporary measures. Practices discussed include the following.

- Earth Dike
- Drainage Swale
- Interceptor Dikes and Swales
- Temporary Stream Crossing
- Temporary Storm Drain Diversion
- Pipe Slope Drains
- Subsurface Drains
- Silt Fence
- Gravel or Stone Filter Berm
- Storm Drain Inlet Protection
- Sediment Trap
- Temporary Sediment Basin
- Outlet Protection
- Check Dams
- Surface Roughening
- Gradient Terraces.

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Structural Practices **Parts IV.D.2.a.(2).(a). and (b).** For common drainage locations that serve an area with 10 or more disturbed acres at one time, a temporary (or permanent) sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. The 3,600 cubic feet of storage area per acre drained does not apply to flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around the sediment basin. For drainage locations which serve 10 or more disturbed acres at one time and where a temporary sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent controls is not attainable, sediment traps should be used. At a minimum, silt fences or equivalent sediment controls are required for all sideslope and downslope boundaries of the construction area. For drainage locations serving less than 10 acres, sediment traps, silt fences or equivalent sediment controls are required for all sideslope and downslope boundaries of the construction area unless a sediment basin providing storage for 3,600 cubic feet of storage per acre drained is provided.

Earth Dike

What Is It

An earth dike is a ridge or ridge and channel combination used to protect work areas from upslope runoff and to divert sediment-laden water to appropriate traps or stable outlets. The dike consists of compacted soil and stone, riprap, or vegetation to stabilize the channel.

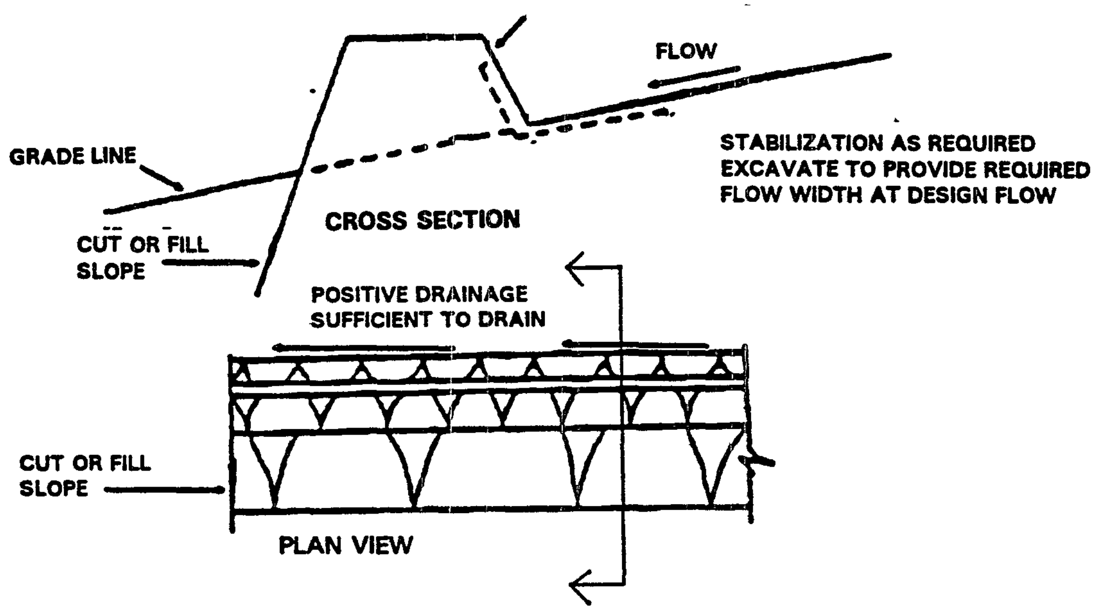


FIGURE 3.10 EARTH DIKE
(Modified from Maryland Department of the Environment, 1991)

When and Where to Use It

Earth dikes are used in construction areas to control erosion, sedimentation, or flood damage. Earth dikes can be used in the following situations:

- Above disturbed existing slopes and above cut or fill slopes to prevent runoff over the slope
- Across unprotected slopes, as slope breaks, to reduce slope length
- Below slopes to divert excess runoff to stabilized outlets
- To divert sediment laden water to sediment traps
- At or near the perimeter of the construction area to keep sediment from leaving the site

- Above disturbed areas before stabilization to prevent erosion and maintain acceptable working conditions

- Temporary diversions may also serve as sediment traps when the site has been overexcavated on a flat grade or in conjunction with a sediment fence.

What to Consider

Despite an earth dike's simplicity, improper design can limit its effectiveness; therefore, the State or local requirements should be consulted. Some general considerations include proper compaction of the earth dike, appropriate location to divert the intercepted runoff, and properly designed ridge height and thicknesses. Earth dikes should be constructed along a positive grade. There should be no dips or low points in an earth dike where the storm water will collect (other than the discharge point). Also, the intercepted runoff from disturbed areas should be diverted to a sediment-trapping device. Runoff from undisturbed areas can be channeled to an existing swale or to a level spreader. Stabilization for the dike and flow channel of the drainage swale should be accomplished as soon as possible. Stabilization materials can include vegetation or stone/riprap.

Advantages of an Earth Dike
• Can be constructed from materials and equipment which are typically already present on a construction site
Disadvantages of an Earth Dike
• Frequent inspection and maintenance required

Drainage Swale

What Is It

A drainage swale is a channel with a lining of vegetation, riprap, asphalt, concrete, or other material. It is constructed by excavating a channel and applying the appropriate stabilization.

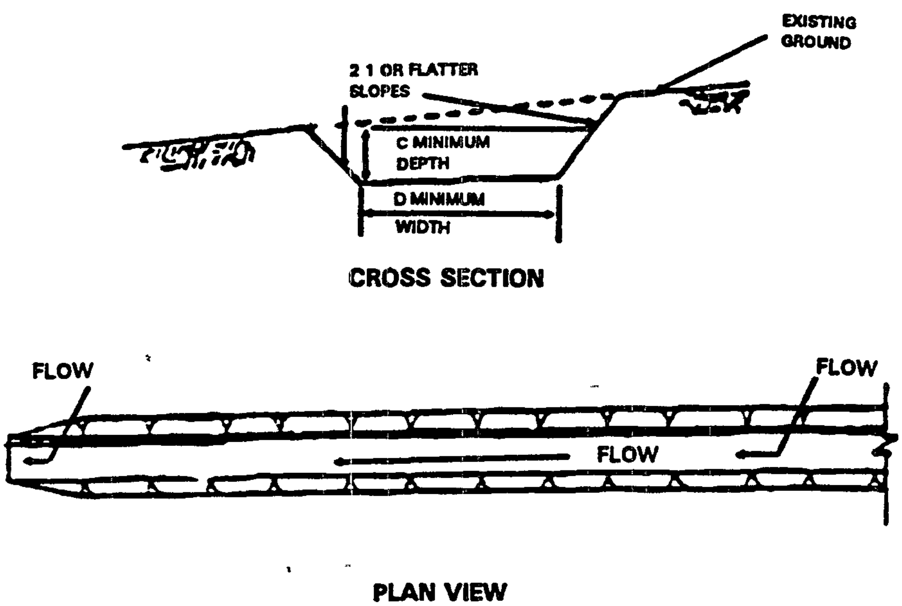


FIGURE 3.11 TEMPORARY SWALE
(Modified from Maryland Department of the Environment, 1991)

When and Where to Use It

A drainage swale applies when runoff is to be conveyed without causing erosion. Drainage swales can be used to convey runoff from the bottom or top of a slope. Drainage swales accomplish this by intercepting and diverting the flow to a suitable outlet. For swales draining a disturbed area, the outlet can be to a sediment trapping device prior to its release.

What to Consider

Since design flows, channel linings, and appropriate outlet devices will need to be considered, consult your State's requirements on such erosion control measures prior to constructing a drainage swale. General considerations include:

- Divert the intercepted runoff to an appropriate outlet

- **The swale should be lined using geotextiles, grass, sod, riprap, asphalt, or concrete. The selection of the liner is dependent upon the volume and the velocity of the anticipated runoff.**
- **The swale should have a positive grade. There should be no dips or low points in the swale where storm water will collect.**

Advantages of a Drainage Swale
• Excavation of swale can be easily performed with earth moving equipment
• Can transport large volumes of runoff
Disadvantages of a Drainage Swale
• Stabilization and design costs can make construction expensive
• Use is restricted to areas with relatively flat slopes

Interceptor Dikes and Swales

What Are They

Interceptor dikes (ridges of compacted soil) and swales (excavated depressions) are used to keep upslope runoff from crossing areas where there is a high risk of erosion. They reduce the amount and speed of flow and then guide it to a stabilized outfall (point of discharge) or sediment trapping area (see sections on Sediment Traps and Temporary Sediment Basins). Interceptor dikes and swales divert runoff using a combination of earth dike and vegetated swale. Runoff is channeled away from locations where there is a high risk of erosion by placing a diversion dike or swale at the top of a sloping disturbed area Dikes and swales also collect overland flow, changing it into concentrated flows. Interceptor dikes and swales can be either temporary or permanent storm water control structures.

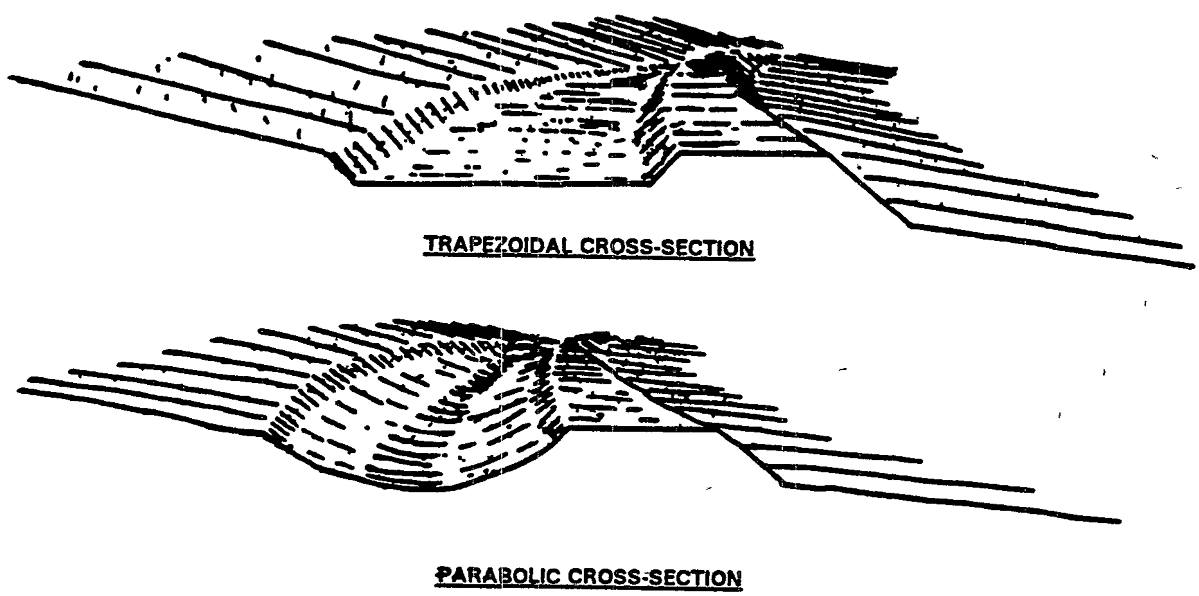


FIGURE 3.12 TYPICAL INTERCEPTOR DIKES AND SWALES
(Modified from State of Maryland, 1983)

When and Where to Use Them

Interceptor dikes and swales are generally built around the perimeter of a construction site before any major soil disturbing activity takes place. Temporary dikes or swales may also be used to protect existing buildings; areas, such as stockpiles; or other small areas that have not yet been fully stabilized. When constructed along the upslope perimeter of a disturbed or high-risk area (though not necessarily all the way around it), dikes or swales prevent runoff from uphill areas from crossing the unprotected slope. Temporary dikes or swales constructed on the down slope side of the disturbed or high-risk area will prevent runoff that contains sediment from leaving the site before sediment is removed For short slopes, a dike or swale at the top of the slope reduces the amount of runoff reaching the disturbed area. For longer slopes, several dikes or swales are placed across the slope at intervals. This practice reduces the amount of runoff that accumulates on the face of the slope and carries the runoff safely down the slope. In all cases, runoff is guided to a sediment trapping area or a stabilized outfall before release.

What to Consider

Temporary dikes and swales are used in areas of overland flow; if they remain in place longer than 15 days, they should be stabilized. Runoff channeled by a dike or swale should be directed to an adequate sediment trapping area or stabilized outfall Care should be taken to provide enough slope for drainage but not too much slope to cause erosion due to high runoff flow speed. Temporary interceptor dikes and swales may remain in place as long as 12 to 18 months (with proper stabilization) or be rebuilt at the end of each day's activities. Dikes or swales should remain in place until the area they were built to protect is permanently stabilized. Interceptor dikes and swales can be permanent controls However, permanent controls. should be designed to handle runoff after construction is complete; should be permanently stabilized; and should be inspected and maintained on a regular basis. Temporary and permanent control measures should be inspected once each week on a regular schedule and after every storm. Repairs necessary to the dike and flow channel should be made promptly.

Advantages of Interceptor Dikes and Swales
• Are simple and effective for channeling runoff away from areas subject to erosion • Can handle flows from large drainage areas • Are inexpensive because they use materials and equipment normally found onsite
Disadvantages of Interceptor Dikes and Swales
• If constructed improperly, can cause erosion and sediment transport since flows are concentrated • May cause problems to vegetation growth if water flow is too fast • Require additional maintenance, inspections, and repairs

Temporary Stream Crossing

What Is It

A temporary stream crossing is a bridge or culvert across a stream or watercourse for short-term use by construction vehicles or heavy equipment Vehicles moving over unprotected stream banks will damage the bank, thereby releasing sediments and degrading the stream bank. A stream crossing provides a means for construction vehicles to cross streams or watercourses without moving sediment to streams, damaging the streambed or channel, or causing flooding.

When and Where to Use It

A temporary stream crossing is used when heavy equipment should be moved from one side of a stream channel to another, or where light-duty construction vehicles have to cross the stream channel frequently for a short period of time. Temporary stream crossings should be constructed only when it is necessary to cross a stream and a permanent crossing is not yet constructed.

- Bridges—Where available materials and designs are adequate to bear the expected loadings, bridges are preferred as a temporary stream crossing

- Culverts—Culverts are the most common type of stream crossings and are relatively easy to construct A pipe, which is to carry the flow, is laid into the channel and covered by gravel.

What to Consider

When feasible, one should always attempt to minimize or eliminate the need to cross streams. Temporary stream crossings are a direct source of pollution, therefore, every effort should be made to use an alternate method (e g , longer detour), when feasible. When it becomes necessary to cross a stream, a well planned approach will minimize the damage to the stream bank and reduce erosion The design of temporary stream crossings requires knowledge of the design flows and other information, therefore, a professional engineer and specific State and local requirements should be consulted. State/local jurisdictions may require a separate permit for temporary stream crossings, contact them directly to learn about their exact requirements.

The specific loads and the stream conditions will dictate what type of stream crossing to employ. Bridges are the preferred method to cross a stream as they provide the least obstruction to flows and fish migration

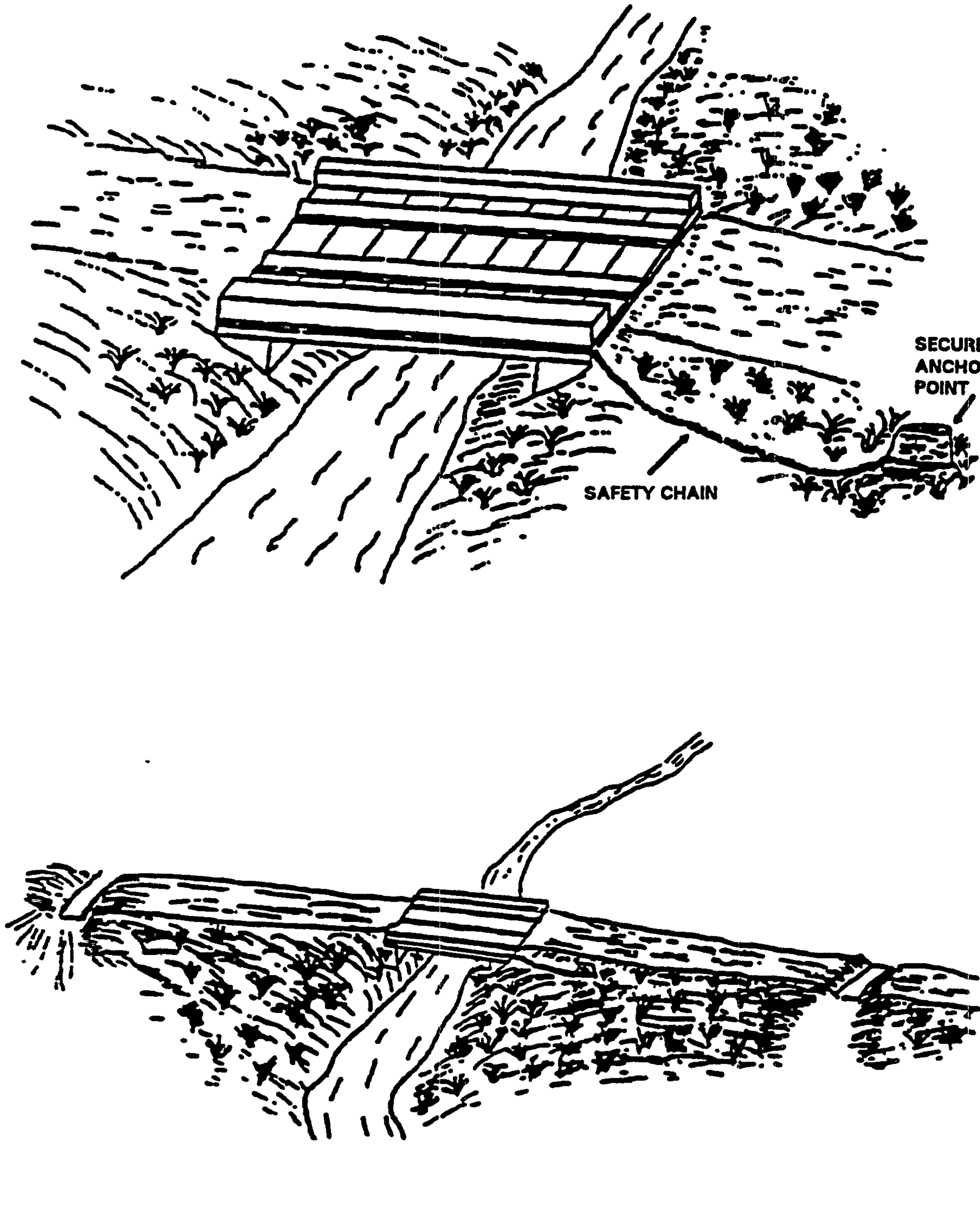


FIGURE 3.13 TEMPORARY ACCESS BRIDGE
(Modified from Maryland Department of the Environment, 1991)

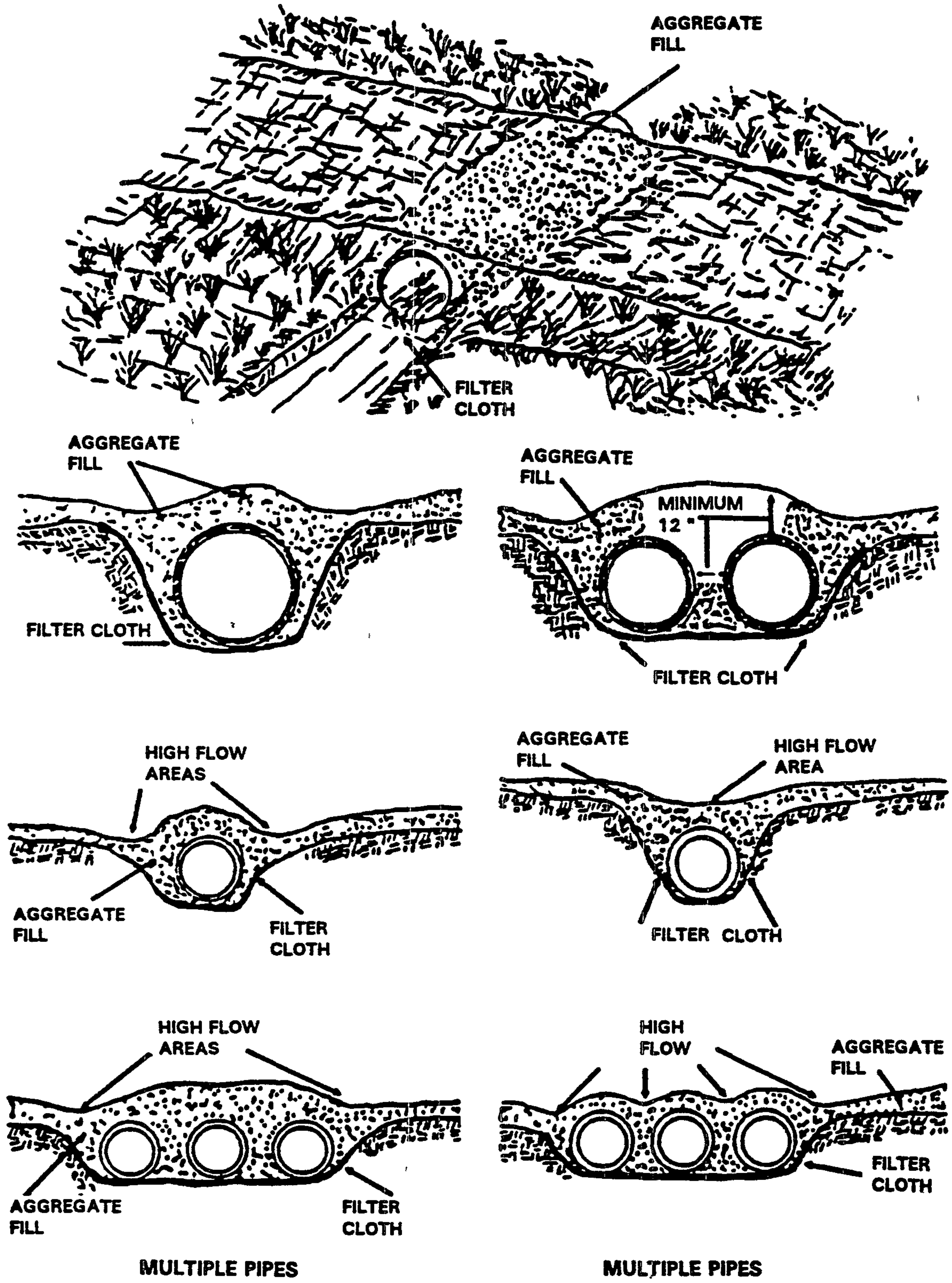


FIGURE 3.14 TEMPORARY ACCESS CULVERT
(Modified from Maryland Department of the Environment, 1991)

Advantages of a Temporary Stream Crossing
• Bridges provide the least obstruction to flow and fish migration and the construction material can be salvaged • Culverts are inexpensive and easily installed structures
Disadvantages of a Temporary Stream Crossing
• Bridges are expensive to design and install • Culverts cause greater disturbances during installation and removal

Temporary Storm Drain Diversion

What Is It

\ temporary storm drain is a pipe which redirects an existing storm drain system or outfall channel o discharge into a sediment trap or basin.

When and Where to Use It

Jse storm drain diversions to temporarily divert flow going to a permanent outfall. This diverted low should be directed to a sediment-trapping device. A temporary storm drain diversion should emain in place as long as the area draining to the storm sewer remains disturbed. Another method s to delay completion of the permanent outfall and instead using temporary diversions to a ediment trapping device before discharge Finally, a sediment trap or basin can be constructed ɔelow a permanent storm drain outfall The basin would be designed to trap any sediment before inal discharge.

What to Consider

Since the existing storm draining systems will be modified, careful consideration to piping configuration and resulting impact of installing a temporary storm drain diversion should be given. The temporary diversions will also need to be moved, once the construction has ceased and it is necessary to restore the original storm drainage systems Therefore, appropriate restoration measures such as flushing the storm drain prior to removal of the sediment trap or basin, stabilizing the outfall, restoration of grade areas, etc should be taken And finally, the State or local requirements should be consulted for detailed requirements.

Advantages of a Temporary Storm Drain Diversion
• Requires little maintenance once installed
Disadvantages of a Temporary Storm Drain Diversion
• Disturbs existing storm drainage patterns

Pipe Slope Drains

What Are They

Pipe slope drains reduce the risk of erosion by discharging runoff to stabilized areas. Made of flexible or rigid pipe, they carry concentrated runoff from the top to the bottom of a slope that has already been damaged by erosion or is at high risk for erosion. They are also used to drain saturated slopes that have the potential for soil slides Pipe slope drains can be either temporary or permanent depending on the method of installation and material used.

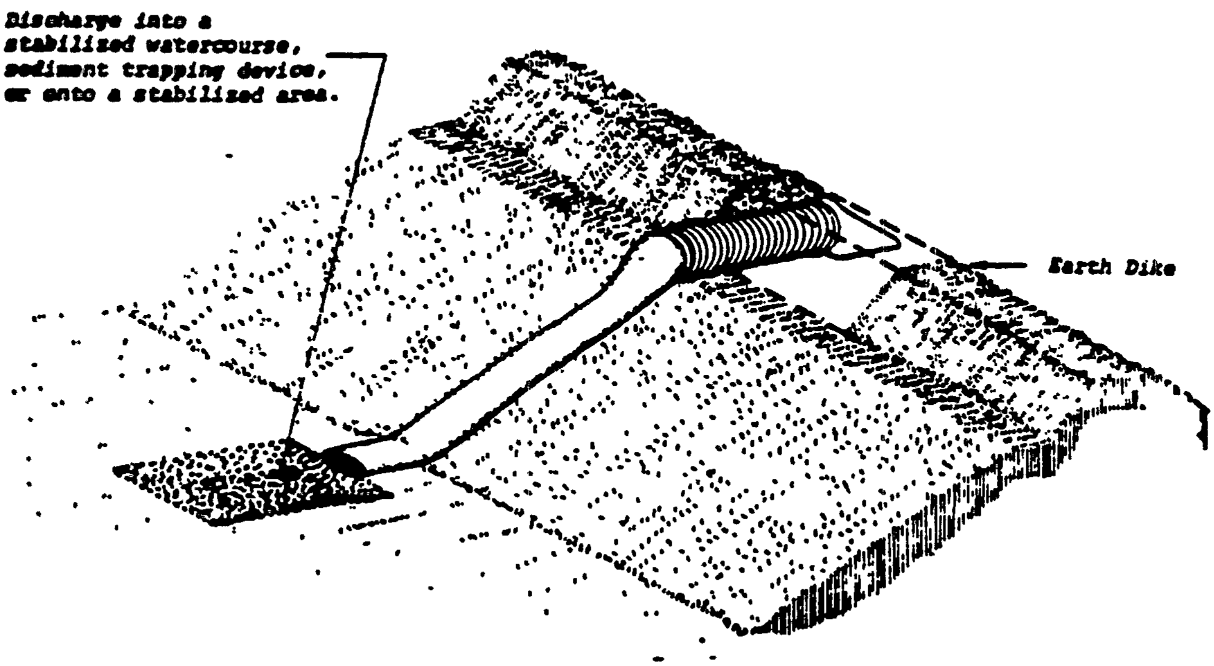


FIGURE 3.15 FLEXIBLE PIPE SLOPE DRAIN
(Modified from State of Maryland, 1983)

When and Where to Use Them

Pipe slope drains are used whenever it is necessary to convey water down a slope without causing erosion. They are especially effective before a slope has been stabilized or before permanent drainage structures are ready for use. Pipe slope drains may be used with other devices, including diversion dikes or swales, sediment traps, and level spreaders (used to spread out storm water runoff uniformly over the surface of the ground). Temporary pipe slope drains, usually flexible tubing or conduit, may be installed prior to the construction of permanent drainage structures. Permanent slope drains may be placed on or beneath the ground surface; pipes, sectional downdrains, paved chutes, or clay tiles may be used.

Paved chutes may be covered with a surface of concrete or other impenetrable material. Subsurface drains can be constructed of concrete, PVC, clay tile, corrugated metal, or other permanent material

What to Consider

The drain design should be able to handle the volume of flow. The inlets and outlets of a pipe slope drain should be stabilized This means that a flared end section should be used at the entrance of the pipe The soil around the pipe entrance should be fully compacted. The soil at the discharge end of the pipe should be stabilized with riprap (a combination of large stones, cobbles, and boulders). The riprap should be placed along the bottom of a swale which leads to a sediment trapping structure or another stabilized area

Pipe slope drains should be inspected on a regular schedule and after any major storm. Be sure that the inlet from the pipe is properly installed to prevent bypassing the inlet and undercutting the structure If necessary, install a headwall, riprap, or sandbags around the inlet. Check the outlet point for erosion and check the pipe for breaks or clogs Install outlet protection if needed and promptly clear breaks and clogs.

Advantages of Pipe Slope Drains
• Can reduce or eliminate erosion by transporting runoff down steep slopes or by draining saturated soils • Are easy to install and require little maintenance
Disadvantages of Pipe Slope Drains
• Require that the area disturbed by the installation of the drain should be stabilized or it, too, will be subject to erosion • May clog during a large storm

Subsurface Drains

What Are They

A subsurface drain is a perforated pipe or conduit placed beneath the surface of the ground at a designed depth and grade. It is used to drain an area by lowering the water table. A high water table can saturate soils and prevent the growth of certain types of vegetation. Saturated soils on slopes will sometimes "slip" down the hill. Installing subsurface drains can help prevent these problems.

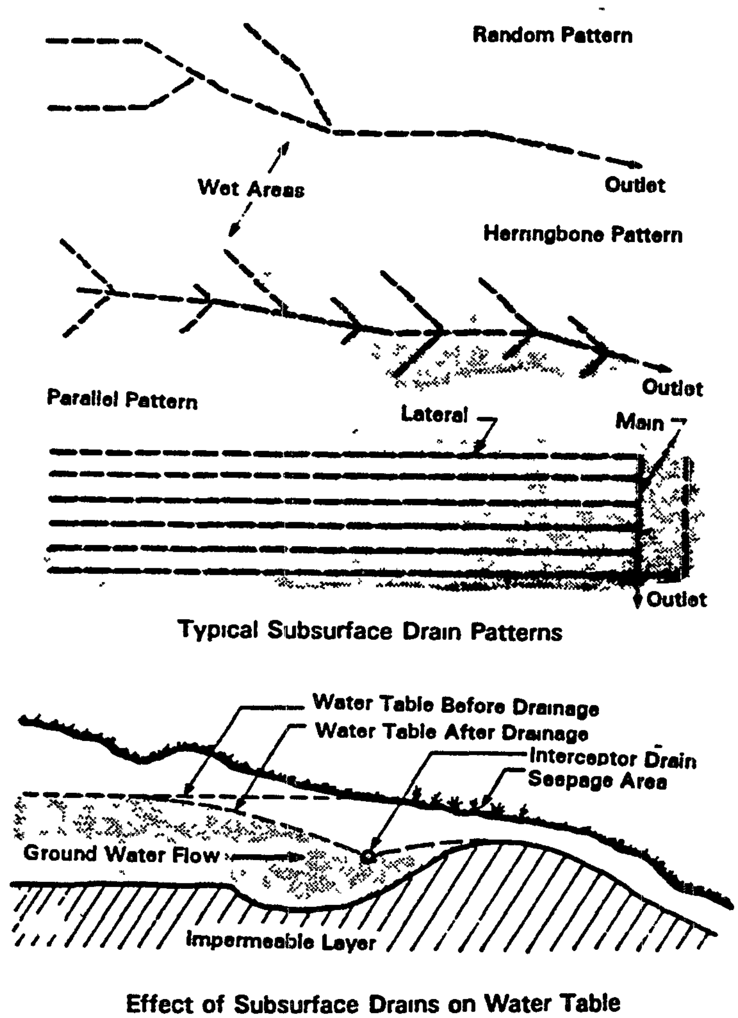


FIGURE 3.16 SUBSURFACE DRAINS (Modified from Commonwealth of Virginia, 1980)

When and Where to Use Them

There are two types of subsurface drains relief drains and interceptor drains. Relief drains are used to dewater an area where the water table is high. They may be placed in a gridiron, herringbone, or random pattern. Interceptor drains are used to remove water where sloping soils are excessively wet or subject to slippage. They are usually placed as single pipes instead of in patterns. Generally, subsurface drains are suitable only in areas where the soil is deep enough for proper installation. They are not recommended where they pass under heavy vehicle crossings.

What to Consider

Drains should be placed so that tree roots will not interfere with drainage pipes. The drain design should be adequate to handle the volume of flow Areas disturbed by the installation of a drain should be stabilized or they, too, will be subject to erosion. The soil layer must be deep enough to allow proper installation.

Backfill immediately after the pipe is placed. Material used for backfill should be open granular soil that is highly permeable The outlet should be stabilized and should direct sediment-laden storm water runoff to a sediment trapping structure or another stabilized area.

Inspect subsurface drains on a regular schedule and check for evidence of pipe breaks or clogging by sediment, debris, or tree roots. Remove blockage immediately, replace any broken sections, and restabilize the surface If the blockage is from tree roots, it may be necessary to relocate the drain. Check inlets and outlets for sediment or debris. Remove and dispose of these materials properly.

Advantages of Subsurface Drains
• Provide an effective method for stabilizing wet sloping soils • Are an effective way to lower the water table
Disadvantages of Subsurface Drains
• May be pierced and clogged by tree roots • Should not be installed under heavy vehicle crossings • Cost more than surface drains because of the expenses of excavation for installation

Silt Fence

What Is It

A silt fence, also called a "filter fence," is a temporary measure for sedimentation control. It usually consists of posts with filter fabric stretched across the posts and sometimes with a wire support fence. The lower edge of the fence is vertically trenched and covered by backfill. A silt fence is used in small drainage areas to detain sediment. These fences are most effective where there is overland flow (runoff that flows over the surface of the ground as a thin, even layer) or in minor swales or drainageways. They prevent sediment from entering receiving waters. Silt fences are also used to catch wind blown sand and to create an anchor for sand dune creation. Aside from the traditional wooden post and filter fabric method, there are several variations of silt fence installation including silt fence which can be purchased with pockets presewn to accept use of steel fence posts.

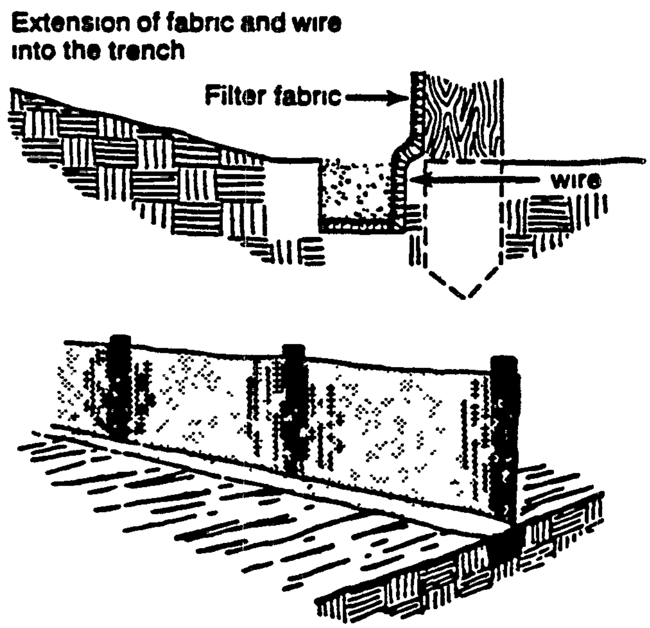


FIGURE 3.17 SILT FENCE DETAILS (Modified from State of North Carolina, 1988; and State of Wisconsin, 1988)

When and Where to Use It

A silt fence should be installed prior to major soil disturbance in the drainage area. The fence should be placed across the bottom of a slope along a line of uniform elevation (perpendicular to the direction of flow). It can be used at the outer boundary of the work area. However, the fence does not have to surround the work area completely. In addition, a silt fence is effective where sheet and rill erosion may be a problem. Silt fences should not be constructed in streams or swales.

What to Consider

A silt fence is not appropriate for controlling runoff from a large area. This type of fence can be more effective than a straw bale barrier if properly installed and maintained. It may be used in combination with other erosion and sediment practices.

The effective life span for a silt fence depends upon the material of construction and maintenance. The fence requires frequent inspection and prompt maintenance to maintain its effectiveness. Inspect the fence after each rainfall. Check for areas where runoff eroded a channel beneath the fence, or where the fence was caused to sag or collapse by runoff flowing over the top. Remove and properly dispose of sediment when it is one-third to one-half the height of the fence or after each storm.

Advantages of a Silt Fence
• Removes sediments and prevents downstream damage from sediment deposits • Reduces the speed of runoff flow • Minimal clearing and grubbing required for installation • Inexpensive
Disadvantages of a Silt Fence
• May result in failure from improper choice of pore size in the filter fabric or improper installation • Should not be used in streams • Is only appropriate for small drainage areas with overland flow • Frequent inspection and maintenance is necessary to ensure effectiveness

Gravel or Stone Filter Berm

What Is It

A gravel or stone filter berm is a temporary ridge constructed of loose gravel, stone, or crushed rock. It slows and filters flow, diverting it from an exposed traffic area Diversions constructed of compacted soil may be used where there will be little or no construction traffic within the right-of way. They are also used for directing runoff from the right-of-way to a stabilized outlet.

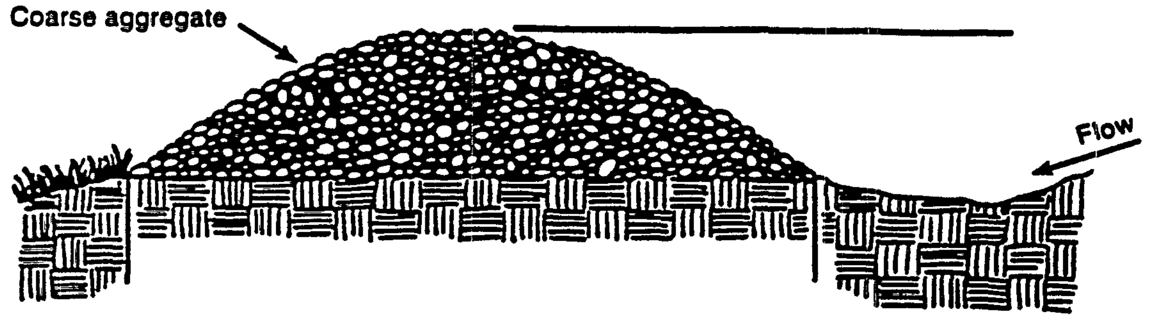


FIGURE 3.18 TYPICAL GRAVEL FILTER BERM
(Modified from Commonwealth of Virginia, 1980)

When and Where to Use It

This method is appropriate where roads and other rights-of-way under construction should accommodate vehicular traffic. Berms are meant for use in areas with gentle slopes. They may also be used at traffic areas within the construction site.

What to Consider

Berm material should be well graded gravel or crushed rock. The spacing of the berms will depend on the steepness of the slope: berms should be placed closer together as the slope increases. The diversion should be inspected regularly after each rainfall, or if breached by construction or other vehicles. All needed repairs should be performed immediately. Accumulated sediment should be removed and properly disposed of and the filter material replaced, as necessary.

Advantages of a Gravel or Stone Filter Berm
• Is a very efficient method of sediment control • Reduces the speed of runoff flow
Disadvantages of a Gravel or Stone Filter Berm
• Is more expensive than methods that use onsite materials • Has a very limited life span • Can be difficult to maintain because of clogging from mud and soil on vehicle tires

Storm Drain Inlet Protection

What Is It

Storm drain inlet protection is a filtering measure placed around any inlet or drain to trap sediment. This mechanism prevents the sediment from entering inlet structures Additionally, it serves to prevent the silting-in of inlets, storm drainage systems, or receiving channels. Inlet protection may be composed of gravel and stone with a wire mesh filter, block and gravel, filter fabric, or sod.

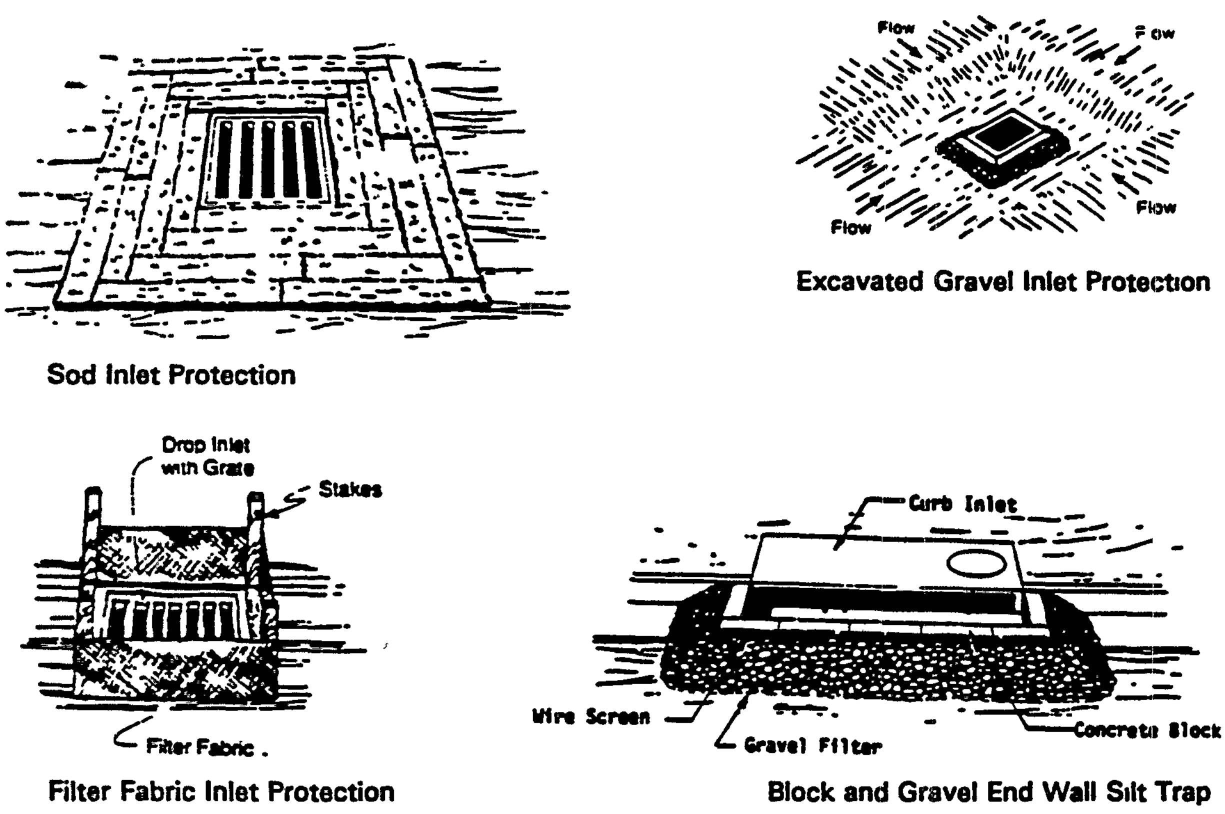


FIGURE 3.19 EXAMPLES OF STORM DRAIN INLET PROTECTION
(Modified from State of North Carolina, 1988, Washington State, 1992; and County of Fairfax, 1987)

When and Where to Use It

This type of protection is appropriate for small drainage areas where storm drain inlets will be ready for use before final stabilization Storm drain inlet protection is also used where a permanent storm drain structure is being constructed onsite Straw bales are not recommended for this purpose. Filter fabric is used for inlet protection when storm water flows are relatively small with low velocities. This practice cannot be used where inlets are paved because the filter fabric should be staked. Block and gravel filters can be used where velocities are higher. Gravel and mesh filters can be used where flows are higher and subject to disturbance by site traffic. Sod inlet filters are generally used where sediments in the storm water runoff are low.

What to Consider

Storm drain inlet protection is not meant for use in drainage areas exceeding 1 acre or for large concentrated storm water flows. Installation of this measure should take place before any soil disturbance in the drainage area. The type of material used will depend on site conditions and the size of the drainage area Inlet protection should be used in combination with other measures, such as small impoundments or sediment traps, to provide more effective sediment removal. Inlet protection structures should be inspected regularly, especially after a rainstorm. Repairs and silt removal should be performed as necessary. Storm drain inlet protection structures should be removed only after the disturbed areas are completely stabilized

Advantages of Storm Drain Inlet Protection
• Prevents clogging of existing storm drainage systems and the siltation of receiving waters • Reduces the amount of sediment leaving the site
Disadvantages of Storm Drain Inlet Protection
• May be difficult to remove collected sediment • May cause erosion elsewhere if clogging occurs • Is practical only for low sediment, low volume flows (disturbed areas less than one acre)

Sediment Trap

What Is It

A sediment trap is formed by excavating a pond or by placing an earthen embankment across a low area or drainage swale An outlet or spillway is constructed using large stones or aggregate to slow the release of runoff. The trap retains the runoff long enough to allow most of the silt to settle out.

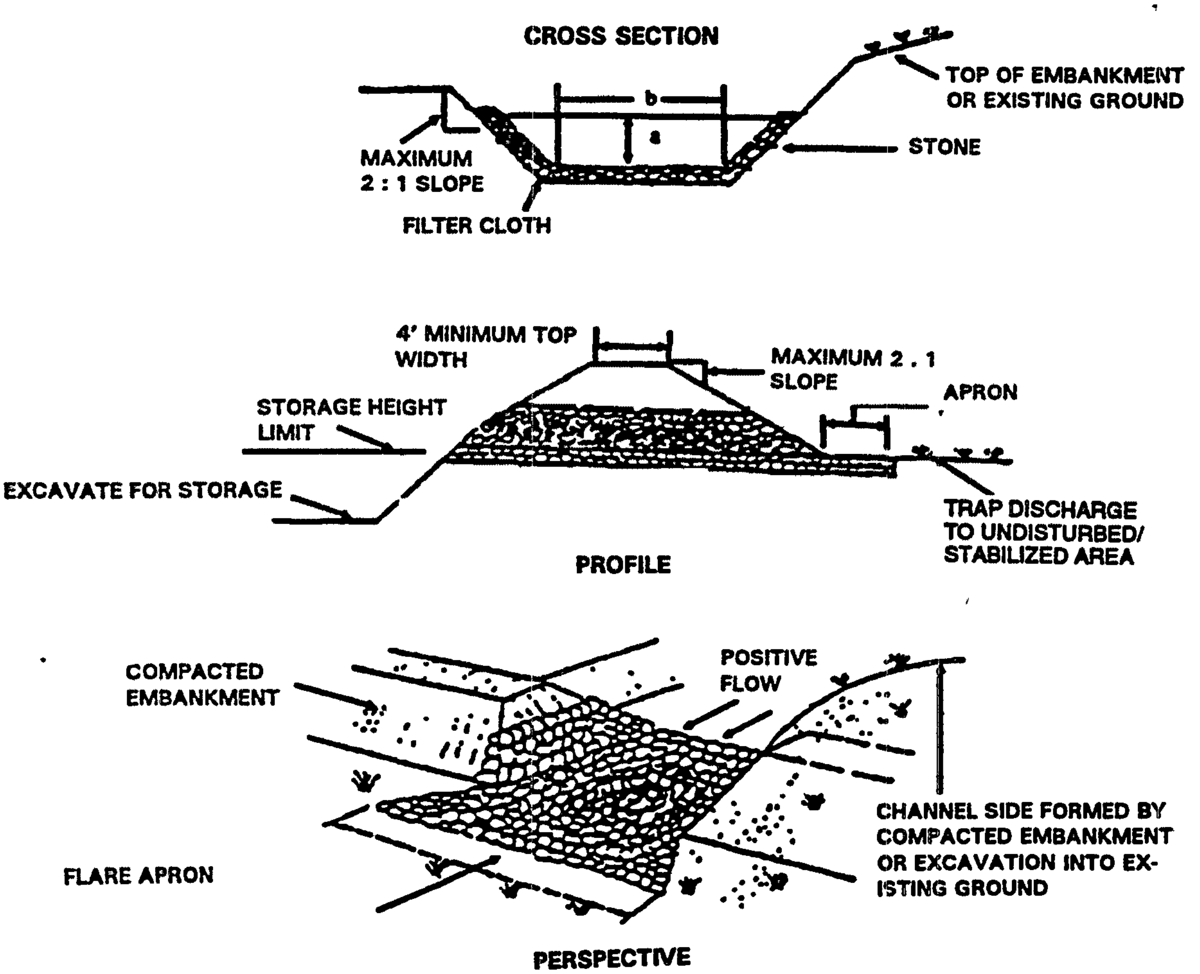


FIGURE 3.20 TYPICAL SEDIMENT TRAP (Modified from State of Maryland, 1991)

When and Where to Use It

A temporary sediment trap may be used in conjunction with other temporary measures, such as gravel construction entrances, vehicle wash areas, slope drains, diversion dikes and swales, or diversion channels.

What to Consider

Sediment traps are suitable for small drainage areas, usually no more than 10 acres. The trap should be large enough to allow the sediments to settle and should have a capacity to store the collected sediment until it is removed. The volume of storage required depends upon the amount and intensity of expected rainfall and on estimated quantities of sediment in the storm water runoff. Check your Permit to see if it specifies a minimum storage volume for sediment traps.

The effective life of a sediment trap depends upon adequate maintenance. The trap should be readily accessible for periodic maintenance and sediment removal. Traps should be inspected after each rainfall and cleaned when no more than half the design volume has been filled with collected sediment. The trap should remain in operation and be properly maintained until the site area is permanently stabilized by vegetation and/or when permanent structures are in place.

Advantages of a Temporary Sediment Trap
• Protects downstream areas from clogging or damage due to sediment deposits • Is inexpensive and simple to install • Can simplify the design process by trapping sediment at specific spots onsite
Disadvantages of a Temporary Sediment Trap
• Is suitable only for a limited area • Is effective only if properly maintained • Will not remove very fine silts and clays

Temporary Sediment Basin

What Is It

A temporary sediment basin is a settling pond with a controlled storm water release structure used to collect and store sediment produced by construction activities. A sediment basin can be constructed by excavation and/or by placing an earthen embankment across a low area or drainage swale. Sediment basins can be designed to maintain a permanent pool or to drain completely dry. The basin detains sediment-laden runoff from larger drainage areas long enough to allow most of the sediment to settle out.

The pond has a riser and pipe outlet with a gravel outlet or spillway to slow the release of runoff and provide some sediment filtration. By removing sediment, the basin helps prevent clogging of offsite conveyance systems and sediment-loading of receiving waterways. In this way, the basin helps prevent destruction of waterway habitats

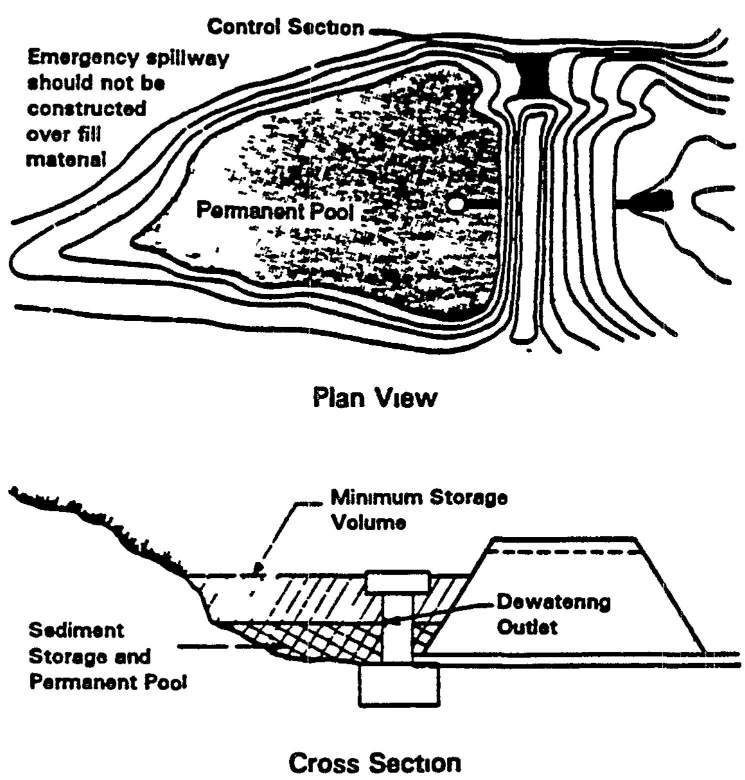


FIGURE 3.21 TEMPORARY SEDIMENT BASIN
(Modified from Commonwealth of Virginia, 1980)

When and Where to Use It

A temporary sediment basin should be installed before clearing and grading is undertaken. It should not be built on an embankment in an active stream. The creation of a dam in such a site may result in the destruction of aquatic habitats. Dam failure can also result in flooding. A temporary sediment basin should be located only if there is sufficient space and appropriate topography. The basin should be made large enough to handle the maximum expected amount of site drainage. Fencing around the basin may be necessary for safety or vandalism reasons.

A temporary sediment basin used in combination with other control measures, such as seeding or mulching, is especially effective for removing sediments.

What to Consider

Temporary sediment basins are usually designed for disturbed areas larger than 5 acres. The pond should be large enough to hold runoff long enough for sediment to settle. Sufficient space should be allowed for collected sediments Check the requirements of your permit to see if there is a minimum storage requirement for sediment basins. The useful life of a temporary sediment basin is dependent upon adequate maintenance.

Sediment trapping efficiency is improved by providing the maximum surface area possible. Because finer silts may not settle out completely, additional erosion control measures should be used to minimize release of fine silt. Runoff should enter the basin as far from the outlet as possible to provide maximum retention time.

Sediment basins should be readily accessible for maintenance and sediment removal. They should be inspected after each rainfall and be cleaned out when about half the volume has been filled with sediment The sediment basin should remain in operation and be properly maintained until the site area is permanently stabilized by vegetation and/or when permanent structures are in place. The embankment forming the sedimentation pool should be well compacted and stabilized with vegetation If the pond is located near a residential area, it is recommended for safety reasons that a sign be posted and that the area be secured by a fence. A well built temporary sediment basin that is large enough to handle the post construction runoff volume may later be converted to use as a permanent storm water management structure.

The sediment basins outlet pipe and spill way should be designed by an engineer based upon an analysis of the expected runoff flow rates from the site. Consult your state/local requirements to determine the frequency of the storm for which the outlet must be designed.

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Sediment Basin Requirements **Part IV.D.2.a.(2).(a).** For common drainage locations that serve an area with 10 or more disturbed acres at one time, a temporary (or permanent) sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. The 3,600 cubic feet of storage area per acre drained does not apply to flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around the sediment basin. For drainage locations which serve 10 or more disturbed acres at one time and where a temporary sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent controls is not attainable, sediment traps, silt fences, or equivalent sediment controls are required for all sideslope and downslope boundaries of the construction area.

Advantages of a Temporary Sediment Basin

- Protects downstream areas from clogging or damage due to sediment deposits generated during construction activities
- Can trap smaller sediment particles than sediment traps can because of the longer detention time
- Can be converted to a permanent storm water detention structure, once construction is complete

Disadvantages of a Temporary Sediment Basin

- Is generally suitable for small areas
- Requires regular maintenance and cleaning
- Will not remove very fine silts and clays unless used in conjunction with other measures
- Is a more expensive way to remove sediment than several other methods
- Requires careful adherence to safety practices since ponds are attractive to children

Outlet Protection

What Is It

Outlet protection reduces the speed of concentrated storm water flows and therefore it reduces erosion or scouring at storm water outlets and paved channel sections. In addition, outlet protection lowers the potential for downstream erosion. This type of protection can be achieved through a variety of techniques, including stone or riprap, concrete aprons, paved sections and settling basins installed below the storm drain outlet.

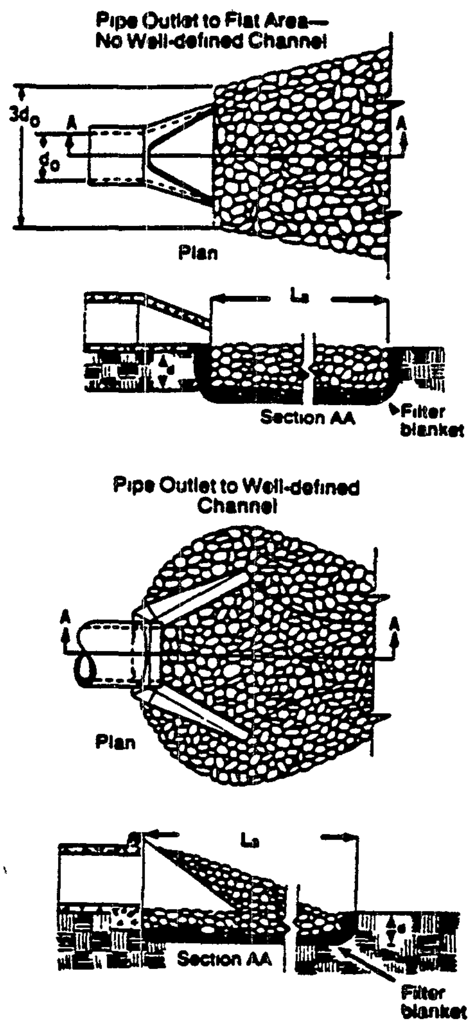


FIGURE 3.22 TYPICAL DETAILS FOR ROCK OUTLET PROTECTION
(Modified from State of North Carolina, 1988)

When and Where to Use It

Outlet protection should be installed at all pipe, interceptor dike, swale, or channel section outlets where the velocity of flow may cause erosion at the pipe outlet and in the receiving channel. Outlet protection should also be used at outlets where the velocity of flow at the design capacity may result in plunge pools (small permanent pools located at the inlet to or the outfall from BMPs). Outlet protection should be installed early during construction activities, but may be added at any time, as necessary.

What to Consider

The exit velocity of the runoff as it leaves the outlet protection structure should be reduced to levels that minimize erosion. Outlet protection should be inspected on a regular schedule to look for erosion and scouring. Repairs should be made promptly.

Advantages of Outlet Protection
• Provides, with riprap-line apron (the most common outlet protection), a relatively low cost method that can be installed easily on most sites • Removes sediment in addition to reducing flow speed • Can be used at most outlets where the flow speed is high • Is an inexpensive but effective measure • Requires less maintenance than many other measures
Disadvantages of Outlet Protection
• May be unsightly • May cause problems in removing sediment (without removing and replacing the outlet protection structure itself) • May require frequent maintenance for rock outlets with high velocity flows

Check Dams

What Are They

A check dam is a small, temporary or permanent dam constructed across a drainage ditch, swale, or channel to lower the speed of concentrated flows. Reduced runoff speed reduces erosion and gullying in the channel and allows sediments to settle out

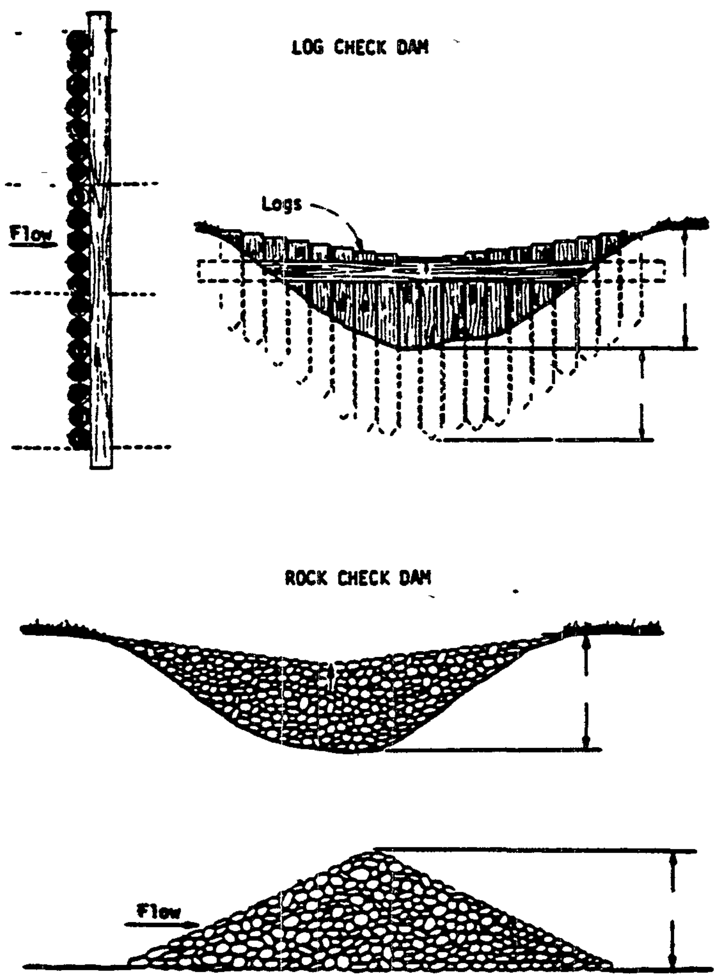


FIGURE 3.23 TYPICAL CHECK DAMS
(Modified from Commonwealth of Virginia, 1980)

When and Where to Use Them

A check dam should be installed in steeply sloped swales, or in swales where adequate vegetation cannot be established A check dam may be built from logs, stone, or pea gravel-filled sandbags.

What to Consider

Check dams should be used only in small open channels which will not be overtopped by flow once the dams are constructed. The dams should not be placed in streams (unless approved by appropriate State authorities). The center section of the check dam should be lower than the edges. Dams should be spaced so that the toe of the upstream dam is at the same elevation as the top of the downstream dam.

After each significant rainfall, check dams should be inspected for sediment and debris accumulation. Sediment should be removed when it reaches one half the original dam height. Check for erosion at edges and repair promptly as required. After construction is complete, all stone and riprap should be removed if vegetative erosion controls will be used as a permanent erosion control measure. It will be important to know the expected erosion rates and runoff flow rate for the swale in which this measure is to be installed. Contact the State/local storm water program agency or a licensed engineer for assistance in designing this measure.

Advantages of Check Dams
• Are inexpensive and easy to install • May be used permanently if designed properly • Allow a high proportion of sediment in the runoff to settle out • Reduce velocity and may provide aeration of the water • May be used where it is not possible to divert the flow or otherwise stabilize the channel
Disadvantages of Check Dams
• May kill grass linings in channels if the water level remains high after it rains or if there is significant sedimentation • Reduce the hydraulic capacity of the channel • May create turbulence which erodes the channel banks

Surface Roughening

Vhat Is It

ırface roughenıng ıs a temporary erosion control practice. The soil surface is roughened by the eation of horizontal grooves, depressions, or steps that run parallel to the contour of the land. opes that are not fine-graded and that are left in a roughened condition can also control erosion. urface roughening reduces the speed of runoff, increases infiltration, and traps sediment. Surface ›ughening also helps establish vegetative cover by reducing runoff velocity and giving seed an pportunity to take hold and grow.

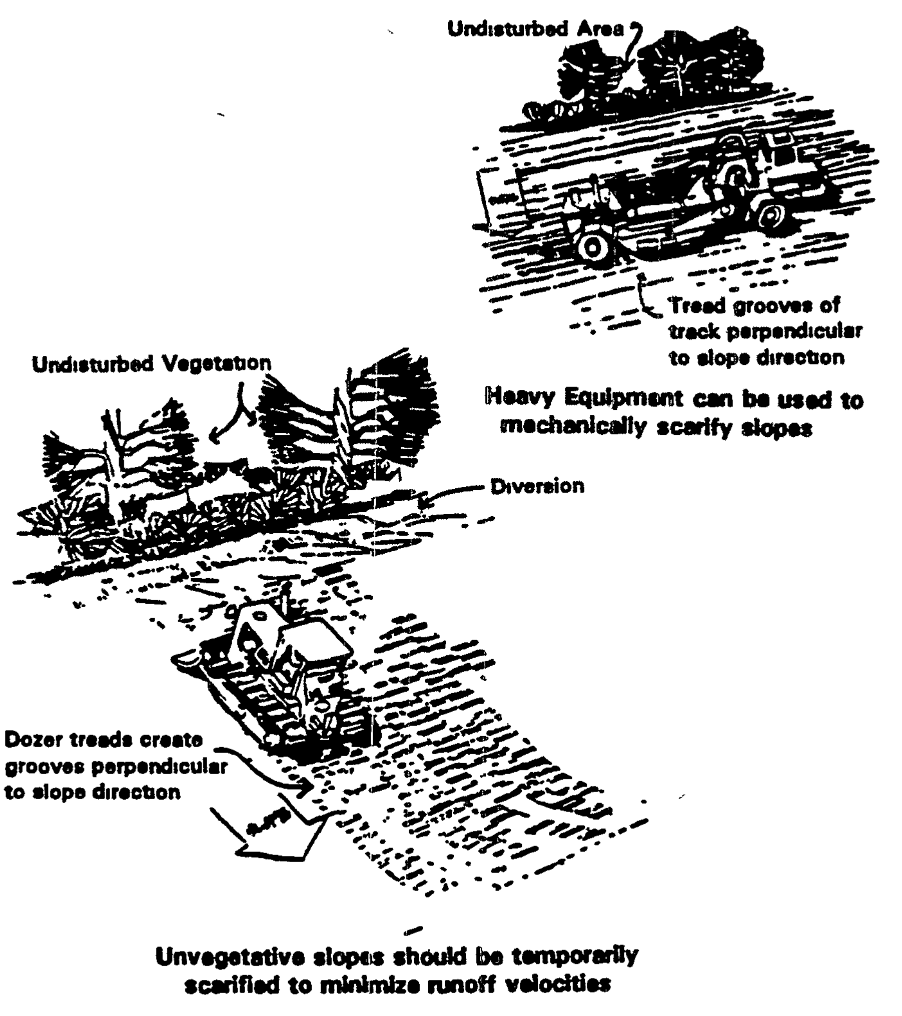


FIGURE 3.24 SURFACE ROUGHENING
(Modified from Washington State, 1992)

When and Where to Use It

Surface roughening is appropriate for all slopes. To slow erosion, roughening should be done as soon as possible after the vegetation has been removed from the slope. Roughening can be used with both seeding and planting and temporary mulching to stabilize an area. For steeper slopes and slopes that will be left roughened for longer periods of time, a combination of surface roughening and vegetation is appropriate. Surface roughening should be performed immediately after grading activities have ceased (temporarily or permanently) in an area.

What to Consider

Different methods can be used to roughen the soil surface on slopes. They include stair-step grading, grooving (using disks, spring harrows, or teeth on a front-end loader), and tracking (driving a crawler tractor up and down a slope, leaving the cleat imprints parallel to the slope contour). The selection of an appropriate method depends on the grade of the slope, mowing requirements after vegetative cover is established, whether the slope was formed by cutting or filling, and type of equipment available.

Cut slopes with a gradient steeper than 3:1 but less than 2:1 should be stair-step graded or groove cut. Stair-step grading works well with soils containing large amounts of small rock. Each step catches material discarded from above and provides a level site where vegetation can grow. Stairs should be wide enough to work with standard earth moving equipment. Grooving can be done by any implement that can be safely operated on the slope, including those described above. Grooves should not be less than 3 inches deep nor more than 15 inches apart. Fill slopes with a gradient steeper than 3:1 but less than 2:1 should be compacted every 9 inches of depth. The face of the slope should consist of loose, uncompacted fill 4 to 6 inches deep that can be left rough or can be grooved as described above, if necessary.

Any cut or filled slope that will be mowed should have a gradient less than 3:1. Such a slope can be roughened with shallow grooves parallel to the slope contour by using normal tilling. Grooves should be close together (less than 10 inches) and not less than 1 inch deep. Any gradient with a slope greater than 2:1 should be stair-stepped.

It is important to avoid excessive compacting of the soil surface, especially when tracking, because soil compaction inhibits vegetation growth and causes higher runoff speed. Therefore, it is best to limit roughening with tracked machinery to sandy soils that do not compact easily and to avoid tracking on clay soils. Surface roughened areas should be seeded as quickly as possible. Also, regular inspections should be made of all surface roughened areas, especially after storms. If rills (small watercourses that have steep sides and are usually only a few inches deep) appear, they should be filled, graded again, and reseeded immediately. Proper dust control procedures should be followed when surface roughening.

Advantages of Surface Roughening
• Provides a degree of instant erosion protection for bare soil while vegetative cover is being established • Is inexpensive and simple for short term erosion control
Disadvantages of Surface Roughening
• Is of limited effectiveness in anything more than a gentle rain • Is only temporary, if roughening is washed away in a heavy storm, the surface will have to be re-roughened and new seed laid

Gradient Terraces

What Are They

Gradient terraces are earth embankments or ridge-and-channels constructed along the face of a slope at regular intervals. Gradient terraces are constructed at a positive grade. They reduce erosion damage by capturing surface runoff and directing it to a stable outlet at a speed that minimizes erosion.

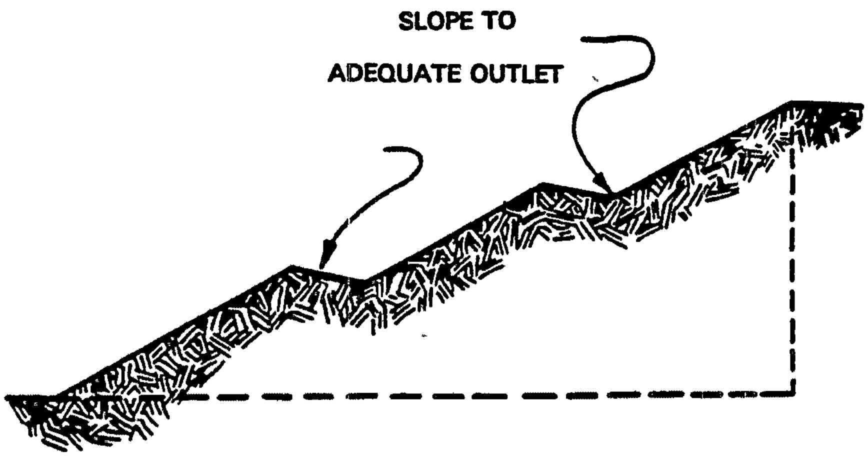


FIGURE 3.25 GRADIENT TERRACE
(Washington State, 1992)

When and Where to Use Them

Gradient terraces are usually limited to use on long, steep slopes with a water erosion problem, or where it is anticipated that water erosion will be a problem Gradient terraces should not be constructed on slopes with sandy or rocky soils They will be effective only where suitable runoff outlets are or will be made available.

What to Consider

Gradient terraces should be designed and installed according to a plan determined by an engineering survey and layout. It is important that gradient terraces are designed with adequate outlets, such as a grassed waterway, vegetated area, or tile outlet. In all cases, the outlet should direct the runoff from the terrace system to a point where the outflow will not cause erosion or other damage. Vegetative cover should be used in the outlet where possible. The design elevation of the water surface of the terrace should not be lower than the design elevation of the water surface in the outlet at their junction, when both are operating at design flow. Terraces should be inspected regularly at least once a year and after major storms. Proper vegetation/stabilization practices should be followed while constructing these features.

Advantages of Gradient Terraces
• Reduce runoff speed and increase the distance of overland runoff flow • Hold moisture better than do smooth slopes and minimize sediment loading of surface runoff
Disadvantages of Gradient Terraces
• May significantly increase cut and fill costs and cause sloughing if excessive water infiltrates the soil • Are not practical for sandy, steep, or shallow soils

3.3 SUMMARY

Erosion of disturbed soils on construction sites can be prevented in many cases. When it is not possible to prevent the erosion, then the sediment can be trapped onsite This chapter describes the measures used for erosion and sediment control and provides guidance for selecting the most appropriate measure for a particular site. The descriptions of the measures contained in this chapter are intended to provide general understanding of the measures rather than detailed design information. Check with your State or local erosion and sediment control agency to obtain a copy of their design standards or guidance. If your State or local agency does not have design standards or guidance, then refer to the design "Fact Sheets" contained in Appendix B of this manual.

Erosion and sediment control measures are a critical component of a Storm Water Pollution Prevention Plan and of a construction project. These measures should be designed and constructed in the most effective manner.

CHAPTER 4

OTHER CONTROLS

Sections 3 and 4 of this manual discuss erosion, sediment, and storm water management controls which are used to prevent or reduce pollution from construction sites, however, these are not the only potential sources of pollution from construction activity. Chemicals and other materials used and stored on a construction site, and construction activities themselves can become significant sources of pollution This chapter will cover some of the control measures and practices used to prevent contact between storm water and potential sources of contamination or pollution. It will also help you to identify many potential sources including specific materials and chemicals, problem areas, procedures, and general construction practices. The controls and practices are called Best Management Practices (BMPs) and are an important part of site-specific controls in your Storm Water Pollution Prevention Plan The BMPs in this chapter deal with prevention—that is, limiting contact between storm water and a potential pollutant BMPs aimed at the removal of pollutants are considered treatment type BMPs

This chapter also addresses how to control allowable non-storm water discharges on your site. This chapter provides guidance as to what types of non-storm water discharges are allowable and what measures should be taken to limit or control pollution caused by these discharges

Q. Are there other controls that should be used on all construction sites?

Typically, there are no specific BMPs that should be used on all construction sites. Only the controls which best address site-specific conditions should be implemented to control or eliminate contamination of storm water. There are four areas of control (in addition to erosion and sedimentation controls and storm water management) that should be addressed in each Storm Water Pollution Prevention Plan. The controls that should be addressed include. minimization of offsite vehicle tracking of sediments; disposal of building material wastes; compliance with applicable State or local waste disposal, sanitary sewer, or septic system regulations; and appropriate pollution prevention measures for allowable non-storm water components of discharge. These controls along with additional controls are discussed in the following sections.

Q. How will I know what other BMPs to consider?

Read the section(s) indicated if any of the areas or materials listed below apply to your site. Using the list and the information sections in this chapter should help you to identify potential risks on your site and select the appropriate BMPs.

Activity	Section	Page No.
Accidental Spills	4.6	4-17
Hazardous Products	4.2.2	4-5
Control of Allowable Non-Storm Water Discharges	4.7	4-19
Concrete Trucks	4.2.4	4-6
Stabilized Construction Entrance	4.3.2	4-9
Construction Road Stabilization	4.3.1	4-8
Construction Wastes	4.2.1	4-4
Contaminated Soils	4.2.3	4-6
Dewatering	4 7.1	4-21
Fertilizers/Detergents	4.5.3	4-15
Hazardous Products	4.5.5	4-16
Material Management	4.5	4-13
Natural Geologic Drainage	4.5 4	4-16
Paints	4 2.2	4-5
Pesticides	4.5.1	4-14
Petroleum Products	4.5.2	4-14
Sandblasting Grits	4.2.5	4-6
Sanitary/Septic Disposal	4.4	4-12
Sump Pit	4.7.2	4-22

Q. What information should you include in your Storm Water Pollution Prevention Plan regarding the controls you are planning for your site?

The following basic information should be a part of your Storm Water Pollution Prevention Plan:

- Provide a narrative description of each practice
- Show the location of each control measure on your site map (if possible)
- Describe the maintenance, inspection, repair, and recordkeeping procedures that will ensure control measures remain effective and in working order during the construction activity
- Describe employee training necessary for the operation and maintenance of the practice or control.

See Chapter 5 for additional information on maintenance, inspection, repair, and employee training

4.1 GOOD HOUSEKEEPING

Good housekeeping is basically keeping a clean, orderly construction site. One of the first steps towards preventing storm water contamination is improving housekeeping practices and using good common sense. Good housekeeping practices reduce the possibility of accidental spills, improve the response time if there is a spill, and reduce safety hazards as well.

Q. Are good housekeeping practices expensive?

No, good housekeeping practices are inexpensive, relatively easy to implement, and are often effective in preventing storm water contamination

Q. What are some examples of good housekeeping practices?

Examples of good housekeeping on a construction site include

- Neat and orderly storage of any chemicals, pesticides, fertilizers, fuels, etc., that are being stored at the site
- Regular garbage, rubbish, construction waste, and sanitary waste disposal
- Prompt cleanup of any spills that have occurred of liquid or dry materials
- Cleanup of sediments that have been tracked by vehicles or have been transported by wind or storm water about the site or onto nearby roadways

4.2 WASTE DISPOSAL

Proper management and disposal of building materials and other construction site wastes is an important part of pollution prevention. Construction site materials which were overlooked as potential sources of storm water contamination in the past, should now be managed more carefully. This section will help you identify the obvious and not so obvious sources on your site. These may be materials, practices, or locations where there is potential risk of pollution. These materials include surplus or refuse building materials as well as hazardous wastes. Practices include trash disposal, recycling, material handling, and spill prevention and cleanup measures. Controls and practices should meet the requirements of your permit and the Federal, State, and local requirements your site is subject to.

This section discusses some of the waste materials encountered at construction sites and discusses generally how these materials should be stored and handled so that their exposure to storm water is minimized. However, this section does not provide specific details on how to handle or dispose of these materials. You should contact the appropriate waste management agency to find out more about waste disposal regulations, or the appropriate occupational health and safety agency to find out about material storage and handling.

4.2.1 Construction Wastes

Construction projects tend to generate a great deal of solid waste material which is unique to this activity. These wastes are sometimes called "construction wastes."

Construction wastes may include but are not limited to·

- Trees and shrubs removed during clearing and grubbing or other phases of construction
- Packaging materials (including wood, paper, plastic, etc.),
- Scrap or surplus building materials, e.g., scrap metals, rubber, plastic and glass pieces, masonry products, and other solid waste materials
- Paints and paint thinners
- Materials resulting from the demolition of structures (rubble).

Q. What steps should be taken to ensure that construction waste is properly disposed of?

The following steps will help ensure proper disposal of construction wastes:

- Select a designated waste collection area onsite
- Provide an adequate number of containers with lids or covers that can be placed over the container prior to rainfall
- When possible, locate containers in a covered area.
- Arrange for waste collection before containers overflow

- If a container does spill, provide cleanup immediately
- Plan for additional containers and more frequent pickups during the demolition phase of construction
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas
- Check with your local solid waste management agency for specific guidance.

4.2.2 Hazardous Products

Many of the materials found at a construction site may be hazardous to the environment or to personnel. It is always important to read the labels of the materials or products you have onsite; they may contain warning information that will help you to be aware of a potential problem. At a minimum, you should consider any products in the categories listed below to be hazardous products (also see Section 4.5 for Material Management):

- Paints
- Acids for cleaning masonry surfaces
- Cleaning solvents
- Chemicals additives used for soil stabilization (e.g., palliative such as calcium chloride)
- Concrete curing compounds and additives.

Q. What are some basic management practices you can use to minimize or prevent impacts on storm water from hazardous products on construction sites?

Most problem situations involving hazardous materials are the result of carelessness or not using good common sense The practices listed here will help you to avoid problems associated with the disposal of hazardous materials Section 4 5 contains further information on storing and handling hazardous materials:

- Check with local waste management authorities to determine what the requirements are for disposing of hazardous materials
- Use all of the product before disposing of the container.
- Do not remove the original product label from the container, it contains important information.
- If you must dispose of surplus products, do not mix products together unless specifically recommended by the manufacturer.
- The correct method of disposal of these products varies with the product used Follow the manufacturer's recommended method, which is often found on the label

4.2.3 Contaminated Soils

Contaminated soils are soils which have been exposed to and still contain hazardous substances. Contaminated soils may be encountered onsite during earthmoving activities or during the cleanup of a spill or leak of a hazardous product Material storage areas may also have been contaminated by undetected spills. The nature of the contaminants may or may not be known.

Q. Where can I get information on disposal options?

Your State or local solid waste regulatory agency should be contacted concerning information and procedures necessary to treat or dispose of contaminated soils. Some landfills may accept contaminated soil; however, laboratory tests may be required prior to a final decision. Private firms can also be consulted concerning disposal options.

4.2.4 Concrete Trucks

Most construction projects include some sort of concrete work. Usually, concrete is mixed offsite and delivered to the project by truck. The concrete is poured and there is a residual amount of concrete remaining in the truck, or occasionally, excess concrete is delivered, or the concrete is found to be unacceptable and is rejected by the construction inspector or foreman. The truck should be cleaned and the residual concrete dumped before it "sets up" (hardens) in the truck.

Q. Are you allowing concrete trucks to washout or dump onsite?

Emptying or wash out of excess concrete may be allowed onsite. Excess concrete and wash water should be disposed of in a manner that prevents contact between these materials and storm water which will be discharged from the site. For example, dikes could be constructed around the area to contain these materials until they harden, at which time they may be properly disposed of.

4.2.5 Sandblasting Grits

Sandblasting is a commonly used technique to remove paint, dirt, etc., from surfaces Sand is sprayed on the surface to be cleaned. Sandblasting grits consist of both the spent sand and the particles of paint and dirt removed from the surface

Q. Why are sandblasting grits a problem?

Sandblasting grits are hazardous waste if they were used to clean old structures where lead, cadmium, or chrome based paints were used. They should not be washed into the storm or sanitary sewer.

Q. What is the best way to dispose of sandblasting grits?

A licensed waste management or transport and disposal firm should be contacted to dispose of this type of used grit.

4.3 MINIMIZING OFFSITE VEHICLE TRACKING OF SEDIMENTS

Day-to-day site practices can have a major impact on storm water contamination because of their potential for generating sediments. A common problem area is offsite vehicle tracking. Two practices are commonly used for minimizing offsite vehicle tracking of sediments: stabilized construction entrances and construction access road stabilization.

Q. What measures have you taken to prevent offsite vehicle tracking?

Controlling offsite tracking of sediments may require attention at most times when there is vehicle traffic at the construction site The measures listed here are effective if used properly.

- A stabilized construction entrance and construction road are very effective methods for reducing offsite tracking of mud, dirt, and rocks
- Paved streets adjacent to the site should be swept to remove any excess mud, dirt, or rock tracked from the site
- Deliveries or other traffic should be scheduled at a time when you will have personnel available to provide cleanup if it is required

4.3.1 Construction Road Stabilization

What Is It

A stabilized construction road is a road built to provide a means for construction vehicles to move around the site without causing significant erosion A stabilized construction road is designed to be well drained so that water does not puddle or flood the road during wet weather. It typically will have a swale along one or both sides of the road to collect and carry away runoff. Stabilized construction roads should be have a layer of crushed stone or gravel which will cover and protect the soil below from erosion.

When and Where to Use It

A stabilized construction road should be installed in a disturbed area where there will be a high volume of construction traffic expected. A construction road should be stabilized at the beginning of construction and maintained throughout construction. Construction parking areas should be stabilized as well as the roads. A stabilized construction road should not be located in a cut or fill area until after grading has been performed

What to Consider

Stabilized construction roads should be built to conform to the site grades; this will require a minimum amount of cut and fill. They should also be designed so that the side slopes and road grades are not excessively steep Construction roads should not be constructed in areas which are wet, or on highly erodible soils.

Advantages of Construction Road Stabilization
• Reduces the amount of erosion, dust, and tracking of soil off of the site. • Provides an effective way for vehicles to move around the construction site, even during wet weather
Disadvantages of Construction Road Stabilization
• Can be expensive • May require maintenance to replace gravel or repair ruts

4.3.2 Stabilized Construction Entrance

What Is It

A stabilized construction entrance is a portion of the construction road which is constructed with filter fabric and large stone The primary purpose of a stabilized construction entrance is to reduce the amount of soil tracked off of the construction site by vehicles leaving the site. The rough surface of the stone will shake and pull the soil off of the vehicles tires as it drives over the entrance. The stone will also reduce erosion and rutting on the portion of the road where it is installed by protecting the soil below. The filter fabric separates the stone from the soil below, preventing the large stone from being ground into the soil The fabric also reduces the amount of rutting caused by the vehicle tires by spreading the weight of the vehicles over a larger soil area than just the tire width

When and Where to Use It

A stabilized construction entrance should be installed at every point where traffic leaves or enters a disturbed area before construction begins on the site Typically, stabilized construction entrances are installed at the locations where the construction traffic enters or leaves an existing paved road, however, a stabilized construction entrance should not be installed over an existing pavement (except for a slight overlap as shown in Figure 4.1) Where the construction will require a permanent access road or driveway, it is recommended that a stabilized construction entrance be installed in this location prior to the permanent pavement.

What to Consider

Stabilized construction entrances should be wide enough and long enough so that the largest construction vehicle will fit in the entrance with room to spare. If a large amount of traffic is expected at an entrance, then the stabilized construction entrance should be wide enough to fit two vehicles across with room to spare

If the stabilized construction entrance has to cross a swale or stream, then a stream crossing should be provided (see page 3-42)

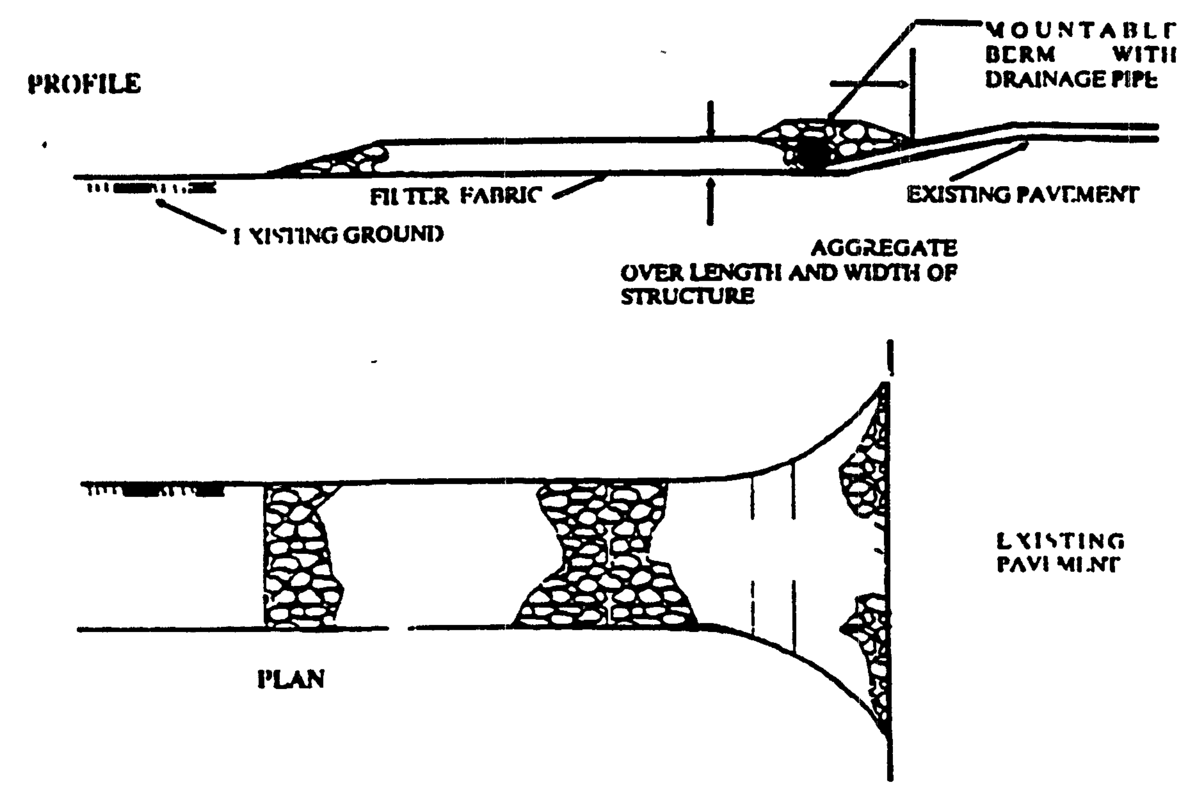


FIGURE 4.1 STABILIZED CONSTRUCTION ENTRANCE
(Modified from Maryland Department of the Environment, 1991)

Stone used for the construction entrance should be large enough so that it is does not get picked up and tracked off of the site by the vehicle traffic. Sharp edged stone should not be used to avoid puncturing tires.

If vehicles will be turning onto the paved road or drive from the stabilized construction entrance, then an apron should be provided as shown above so that vehicles do not go off of the stabilized construction entrance before they leave the site.

The temporary construction entrance may be provided with a vehicle wash rack which drains to a temporary sediment trap or other sediment removing measure. This will allow vehicle tires to be washed prior to leaving the site and ensure that wash water sediments are removed and can be properly disposed of.

Advantages of a Stabilized Construction Entrance
• Is an effective means for reducing the amount of soil tracked off of a construction site • Can improve the appearance of the construction site from the public's point of view
Disadvantages of a Stabilized Construction Entrance
• Only works if it is installed at every location where traffic leaves and enters the site • Cannot always remove all of the soil tracked off of the disturbed areas by vehicles; when soil is tracked onto a road, it should be cleaned up immediately • Stone may have to be added to keep it effective

4.4 SANITARY/SEPTIC DISPOSAL

Q. How should I manage sanitary or septic wastes on a construction site?

Almost all construction sites have sanitary facilities for onsite personnel. The most commonly found facilities are portable facilities that store the sanitary wastes and should be emptied periodically. Other facilities include temporary facilities that employ septic systems for treatment and disposal of the sewage, or temporary facilities that discharge to a sanitary sewer system. Sanitary or septic wastes that are generated onsite should be treated or disposed of in accordance with State or local requirements. Depending upon the facilities that will be used onsite, this may require one or more of the following:

- Domestic waste haulers should be contracted to regularly remove the sanitary and septic wastes and to maintain the facilities in good working order. This will prevent overloading of the system which could allow discharges to storm water runoff.
- Wastes should be treated to an appropriate level before discharging
- Facilities should be properly hooked into the sanitary sewer system to prevent illicit discharges.

Untreated, raw sewage or septage should never be discharged or buried onsite

Q. What do I need to do to ensure and demonstrate that I am complying with State or local sanitary or septic system regulations?

To ensure that you are in compliance with State or local requirements for sanitary or septic wastes, you should contact your local government and State regulatory agencies. Many States have regulations concerning On Site Disposal Systems (OSDS) or discharges to sanitary sewers. Localities often have ordinances which deal with the proper management of sanitary and septic wastes. In addition, if sewage is being discharged to the sanitary sewer, the local Publicly Owned Treatment Works (POTW) should be contacted because they may have certain requirements as well. If wastes are being hauled offsite, your State may have a licensing program for waste haulers. If your State does have this, you should only contract with these licensed haulers. If your State does not, a reputable hauler should be chosen.

Contacting the proper authorities prior to the development of your Storm Water Pollution Prevention Plan will provide you with the information needed for demonstrating compliance with the appropriate regulations.

4.5 MATERIAL MANAGEMENT

Material management is important because the best way to avoid a problem is to try to prevent it at its source. On a construction site the material storage area can become a major source of risk due to possible mishandling of materials or accidental spills An inventory of the material storage area and of the site should be made Special care should be taken to identify any materials that have the potential to come in contact with storm water. This will help raise your awareness and to plan effective controls.

There are a number of risks (other than contamination of storm water) to consider in the management of materials on a construction site, including health and safety of employees, or contamination of groundwater. This section; however, only addresses measures to minimize the risk of storm water contamination. Contact your local regulatory agency to find out about measures to minimize other risks.

Q. What types of materials should be considered when evaluating potential risks?

The following are some of materials commonly found on a construction site The material inventory list should include these for risk assessment.

- Pesticides
- Petroleum products
- Fertilizers and detergents (nutrients)
- Construction chemicals
- Other pollutants
- Hazardous products (also see Hazardous Products Section 4.2.2).

Q. What information would be useful to consider when identifying risks onsite?

The types of information that should be considered and the questions you should ask yourself when identifying risks include

- What types of materials are stored onsite?
- How long will the materials be stored before use?
- Are you storing more than is really needed?
- How are the materials stored and distributed?
- How can potential storm water contact be avoided?

Q. What methods are helpful in reducing potential risks?

Good housekeeping and material management practices for storage and use will help minimize exposure risks. This chapter contains suggested storage and handling practices for your use for the various categories of risks Writing your spill prevention plan (Section 4.6) will also help you to identify ways to cut down the risk of exposure of materials to storm water.

4.5.1 Pesticides

Pesticides include insecticides, rodenticides, and herbicides which are often used on construction sites.

Q. What steps should be taken to reduce the risks in using this type of material?

The steps that should be taken to reduce the risks of using pesticides include the following.

- Handle the materials as infrequently as possible
- Observe all applicable Federal, State, and local regulations when using, handling, or disposing of these materials (Process, Procedures, and Methods to Control Pollution Resulting from All Construction Activity, U.S. EPA).

Q. What management practices could you use for these materials?

The management practices used to reduce the amounts of pesticides that could contact storm water include the following.

- Store pesticides in a dry covered area
- Provide curbs or dikes to contain the pesticide if it should spill
- Have measures on site to contain and clean up spills of pesticides
- Strictly follow recommended application rates, recommended application methods, (i.e., only apply the amounts necessary for the job).

4.5.2 Petroleum Products

Oil, gasoline, lubricants, and asphaltic substances such as paving materials are considered petroleum products. These materials should be handled carefully to minimize their exposure to storm water.

Q. Where do petroleum products usually occur onsite?

Petroleum products usually occur in two site areas

- Areas where road construction of some type is occurring
- Vehicle storage areas or areas of onsite fueling or equipment maintenance.

Q. What steps should be taken to reduce the risks in using this type of material?

These following practices will help to reduce the risks in using petroleum products·

- Have equipment to contain and clean up petroleum spills in fuel storage areas or on board maintenance and fueling vehicles
- Where possible, store petroleum products and fuel vehicles in covered areas and construct dikes to contain any spills
- Contain and clean up petroleum spills immediately
- Preventive maintenance for onsite equipment is one BMP to prevent leakage (e g , check for and fix gas or oil leaks in construction vehicles on a regular basis.)
- Proper application of asphaltic substances (see manufacturers' instructions) will also reduce the risk of a spill

4.5.3 Fertilizers/Detergents

Nutrients such as phosphorous and nitrogen are found on construction sites in both fertilizers and detergents Fertilizers are needed on construction sites to provide the nutrients for plant growth; however, when excess quantities of fertilizers are used or when fertilizers are washed away by storm water runoff, they may be a major source of pollution An excess of nutrients reaching a body of water can cause an overgrowth of water plants which then use up the oxygen in the water, creating an unfavorable environment Detergents can contribute to water pollution if wash waters are released into the environment (see the discussion on non-storm water discharges).

Q. What steps can be taken to reduce the risks of nutrient pollution?

The steps that can be taken to reduce the risks of nutrient pollution include·

- Limit the application of fertilizers to the minimum area and the minimum recommended amounts
- Reduce exposure of nutrients to storm water runoff by working the fertilizer deep into the soil (depth of 4 to 6 inches) (Process, Procedures, and Methods to Control Pollution Resulting from All Construction Activity, U.S EPA), instead of letting it remain on the surface
- Apply fertilizer more frequently, but at lower application rates

- Hydro seeding where lime and fertilizers are applied to the ground surface in one application should be limited where possible
- Limit the use of detergents onsite; wash water containing detergents should not be discharged in the storm water system.
- Implement good erosion and sediment control to help reduce the amount of fertilizers that can leave the site as well as sediments
- Apply fertilizer and use detergents only in the recommended manner and only in recommended amounts.

4.5.4 Natural Geologic Drainage

Other pollutants include acid and alkaline solutions from exposed soil of rock units high in acid, and alkaline forming natural elements.

Q. What steps should be taken to reduce the risks in using this type of material?

The control of these pollutants involves good site planning and pre-construction geological surveys. Neutralizing acid or alkaline solutions often provides the best treatment.

- Seal fractures in the bedrock with grout and bentonite, this method will often reduce the amount of acid or alkaline seepage.

4.5.5 Hazardous Products

Q. What materials are in this category?

As discussed in Section 4.2.2, hazardous materials include (but are not limited to) paints, acids for cleaning masonry surfaces, cleaning solvents, chemical additives used for soil stabilization, and concrete curing compounds.

Q. What are some basic management practices you can use to minimize or prevent impacts from hazardous products on construction sites?

Most problem situations involving hazardous materials and other pollutants are the result of carelessness or not using good common sense. The practices listed below will help to avoid pollution of storm water by these materials.

- Have equipment to contain and clean up spills of hazardous materials in the areas where these materials are stored or used.
- Contain and clean up spills immediately after they occur.
- Keep materials in a dry covered area.

4.6 SPILLS

Spills are a source of storm water contamination, and construction site spills are no exception. Spills can contaminate soil and water, waste materials, and result in potential health risks In addition to the other measures and practices you have adopted, you should prepare to deal quickly and effectively with accidental spills A spill control plan can help you to be prepared. This section discusses your additional responsibilities if there is a reportable quantity spill.

Q. Do you have a spill control plan for your site?

Construction site supervisors should create and adopt a spill control plan which would include measures to

- Stop the source of the spill
- Contain the spill
- Clean up the spill
- Dispose of materials contaminated by the spill
- Identify and train personnel responsible for spill prevention and control.

Q. Do you know what specific spill prevention methods and response to use?

The following measures would be appropriate for a spill prevention and response plan

- Store and handle materials to prevent spills
  - Tightly seal containers
  - Make sure all containers are clearly labeled.
  - Stack containers neatly and securely.
- Reduce storm water contact if there is a spill.
  - Have cleanup procedures clearly posted.
  - Have cleanup materials readily available.
  - Contain any liquid.
  - Stop the source of the spill
  - Cover spill with absorbent material such as kitty litter or sawdust.
- Dispose of contaminated materials according to manufacturer's instructions or according to State or local requirements.
- Identify personnel responsible for responding to a spill of toxic or hazardous materials.
  - Provide personnel spill response training
  - Post names of spill response personnel

- Keep the spill area well ventilated.
- If necessary, use a private firm that specializes in spill cleanup

Check the spill reporting requirements listed in your permit, typically any spill should be reported. See Section 2.

4.7 CONTROL OF ALLOWABLE NON-STORM WATER DISCHARGES

NPDES storm water permits for construction activities typically include a prohibition against non-storm water discharges. Permits will state that all discharges covered by the permit must be composed entirely of storm water. However, permits may list some non-storm water discharges that, when combined with storm water discharges, may be authorized by the permit. These exemptions may be allowed provided they are addressed in the Storm Water Pollution Prevention Plan for the site The following is a list of non-storm water discharges which are typically permitted. However, check your permit to determine what non-storm water discharges are allowable.

- Discharges from fire fighting activities
- Fire hydrant flushings
- Potable water sources (including waterline flushings)
- Uncontaminated ground water (including dewatering ground water infiltration)
- Foundation or footing drains where flows are not contaminated with process materials such as solvents
- Springs, riparian habitats, and wetlands
- Irrigation water
- Exterior building washdown
- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred and where detergents are not used
- Air conditioning condensate

Q. How do these allowable non-storm water discharges relate to discharges on construction sites?

Common construction activity discharges that fall under the allowable non-storm water discharges include the following:

- Waterline flushings from the disinfection of newly installed potable water piping systems
- Irrigation water discharged during seeding and planting practices
- New construction exterior building washdown discharges
- Pavement wash waters from dust control and general housekeeping practices
- Foundation and footing drain discharges from subsurface drainage systems
- Uncontaminated ground waters from dewatering of excavated areas

Q. What should be done with non-allowable non-storm water discharges?

You have three choices for handling non-storm water discharges which are not allowed by your permit:

1. Eliminate the source of the discharge.

2. Apply for a separate permit for the discharge.

3. Direct the discharge to a sanitary sewer system. Note: You should check first with the operator of the sewer system to see if you are allowed to discharge the material in question into the sanitary sewer.

Q. How should the allowable non-storm water discharges be addressed in the Storm Water Pollution Prevention Plan?

The allowable non-storm water discharges should be identified in the Storm Water Pollution Prevention Plan. For each of the discharges, practices or controls that will be used to prevent pollution from these discharges should be described in detail.

Q. What types of controls or practices can be used to prevent pollution from these discharges?

The following general practices should be considered.

- All downslope site sedimentation and erosion controls should be in place prior to the discharge

- Discharges with sediment loads should be discharged so that sediment pollution is minimized. These discharges include dewatering operation discharges, and discharges from sediment traps and basins.

- Discharge should only be directed to areas that are stabilized to minimize erosion (e.g., buffer zones, vegetated filter strips, inlet and outlet protection, level spreaders, etc.). Do not discharge non-storm water flows onto disturbed areas

Q. What types of controls can be used for discharges that have sediments?

Discharges with sediment should be directed to pass through a sediment filtering device Sediment filtering devices include sediment traps, basins, silt fences, vegetated filter strips, sump pits, or sediment tanks.

4.7.1 Dewatering

What Is It

Dewatering is the method used to remove and discharge excess water from a construction site. The most common procedure used is to pump water out of areas where it does not otherwise drain off, such as excavated areas, sediment basins, and sediment traps. Dewatering may also include methods used to lower the ground water table to provide a stabilized area for construction.

When and Where to Use It

Dewatering may be used during construction to remove accumulated water and sediments from sediment traps and basins to ensure their effectiveness throughout the entire project. At the end of the project, dewatering of sediment traps and basins is appropriate prior to removing the last sediment control measures Water remaining in excavated areas may be eliminated by dewatering so that construction can proceed on schedule

What to Consider

Dewatering discharges usually have a very high sediment content; therefore, sediment control should be provided before the discharge enters a receiving water.

Sediment traps and basins are often used to remove sediment from dewatering of excavation areas

Filtering should also be provided when discharge results from dewatering a sediment trap or basin. Methods to consider for this purpose are noted below in order of preference

- A sump pit—discussed in detail in Section 4.7.2
- A floating suction hose which allows clean water at the surface to be pumped out before the hose sinks low enough to pick up sediment-laden water
- A standpipe attached to the base of the sediment basin riser with slits to control inflow and wrapping of filter fabric to aid in filtering sediments

Advantages of Dewatering
• Provides for the proper discharge of water from sediment traps and basins and excavation areas onsite • Use of efficient sediment removal methods (such as a sump pit, floating hose, or standpipe) allows safe release of dewatering discharges into a receiving water
Disadvantages of Dewatering
• The floating hose method requires careful monitoring since pumping should be stopped as soon as sediments are encountered • Even the initial discharge pumped in the floating hose method requires additional filtering • A location should be found to dispose of sediments properly, meeting appropriate Federal, State, and local regulations

4.7.2 Sump Pit

What Is It

A sump pit is a temporary hole or pit placed so that it can collect water from sediment traps and basins, or excavations In the center of the pit is a standpipe with holes which is surrounded by stone. Water that collects in the pit flows through the gravel into the standpipe and is pumped out to a filtering device or, in some cases, directly to a receiving water. The sump pit discharge may be pumped directly to a receiving water only if the standpipe has been properly wrapped in filter fabric.

When and Where to Use It

A sump pit may be used to dewater a sediment trap or basin, or it may be used during construction when water collects in an excavation.

What to Consider

The number of sump pits and their location will depend on the individual site and any State or local requirements.

The standpipe should have holes in it to allow water to flow in and should be extended at least a foot over the top of the pit

If the sump pit is to discharge directly into a receiving water, then the standpipe should be wrapped in filter fabric before the pit is backfilled with stone.

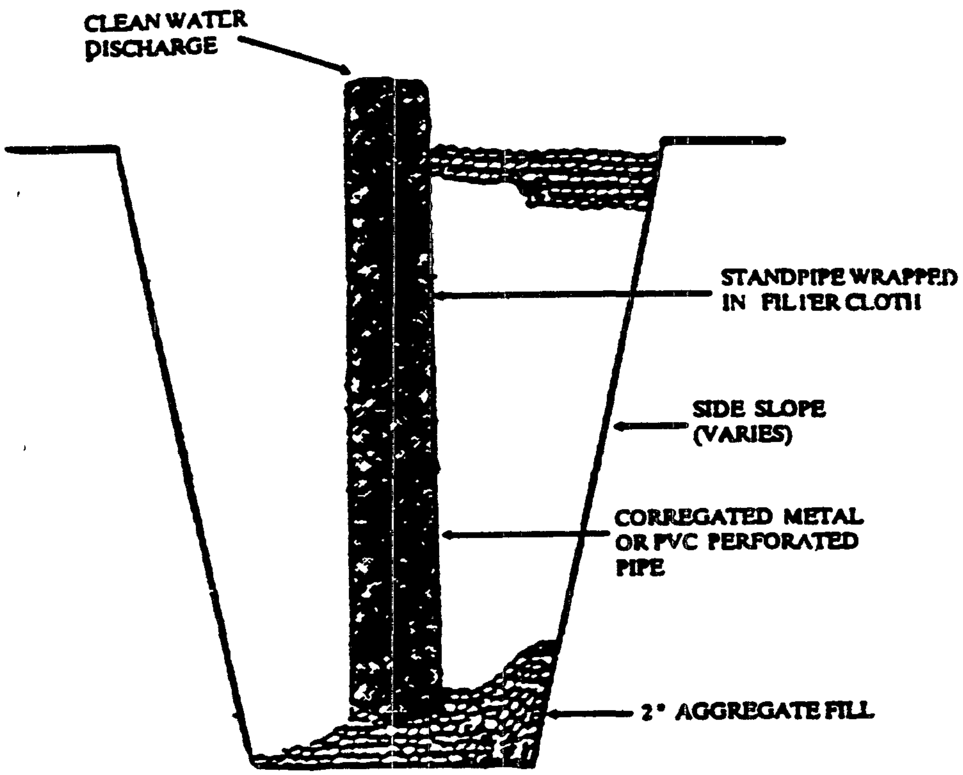


FIGURE 4.2 SUMP PIT
(Modified from Maryland Department of the Environment, 1991

Advantages of a Sump Pit
• A sump pit may be used for dewatering where space is limited, such as in city areas
Disadvantages of a Sump Pit
• If the holes in the standpipe or filter fabric are too small, they will clog

4.8 SUMMARY

There are a number of other controls which should be considered in addition to erosion, sediment, and storm water management while preparing a Storm Water Pollution Prevention Plan These controls include measures which prevent potentially polluting construction materials from coming into contact with storm water. Measures include good housekeeping and proper waste disposal, as well as controls which prevent sediments from being tracked off site by construction vehicles, and proper control of the non-storm water flows on the site. These other controls should not be overlooked. They are an important part of pollution prevention at construction sites.

CHAPTER 5

MAINTENANCE AND INSPECTION

This Chapter discusses the general maintenance and inspection for proper implementation of a Storm Water Pollution Prevention Plan. Maintenance and inspection of storm water pollution control measures is as important to pollution prevention as selection and installation This section is presented in a question and answer format. By answering these questions, you will gain an understanding of how you can plan and perform inspection and maintenance on the pollution prevention controls for your project. The following sections address four components which are critical to a Storm Water Pollution Prevention Plan. inspection, maintenance, recordkeeping, and training

Q: What areas of the construction site will you have to inspect and maintain?

You should inspect and maintain all the disturbed areas of your site, and the areas for material storage. You should also inspect all of the erosion and sediment controls which you identified in the Storm Water Pollution Prevention Plan. These measures may include (but are not limited to) any of the following

- Seeded areas (permanent or temporary)
- Mulched areas
- Areas stabilized with geotextiles
- Sod stabilized areas
- Silt fences
- Earth dikes
- Brush barriers
- Drainage swales
- Sediment traps
- Subsurface drains
- Pipe slope drains
- Level spreaders

- Storm drain inlet protection measures
- Rock outlet protection
- Reinforced soil retaining systems
- Gabions
- Sediment basins.

Q: How long will you have to continue to inspect and maintain these measures?

You should inspect and maintain the pollution prevention measures on your construction site as long as a portion of the site remains disturbed Check the requirements of your permit for the frequency at which inspection and maintenance is required

Q: At what point should you begin to consider inspection and maintenance requirements?

You should begin to consider maintenance requirements at the same time you choose BMPs You will notice that some practices take a good deal more maintenance than others and you may wish to be aware of this when you are deciding which measures to use

Q: What does a maintenance and inspection plan include?

Appendix C includes a sample maintenance and inspection plan A good maintenance and inspection plan should do the following

- Identify all of the areas/measures that will be inspected and maintained
- Provide an inspection schedule for each area/measure
- List the typical maintenance procedures for each measure
- Describe the procedure to follow if additional repair is required, e.g , who will be responsible or who to call
- Provide forms and instructions for record keeping practices
- List the names of personnel assigned to each task
- Indicate what training employees will need to be able to do the job.

5.1 INSPECTION

Inspection is the process by which you can evaluate if the pollution prevention measures which have already been installed or applied are still effective. In most cases, inspection of pollution prevention measures requires that an inspector look at all of the disturbed areas and sediment controls on the site and make some measurements of sediment accumulation (depending upon the measures).

Q: How frequently should inspections take place?

Inspections of pollution prevention measures should be performed on a regular interval plus after every significant rainfall Check your permit to determine the how frequently your site should be inspected and what constitutes a significant rainfall. A regular inspection and maintenance program can reduce the chance of polluting the storm water by finding and correcting problems before the next rain.

Q: What should an inspector look for?

The inspector should look at each measure to determine if it is still effective. Appendix B contains fact sheets with figures and specifications on many of the measures The inspector should consult these fact sheets or the description included in the Storm Water Pollution Prevention Plan and determine if the measures still meet the minimum requirements. For example. the fact sheet for a silt fence shows the bottom of the fabric is placed in a trench and buried with soil or stone The inspector could compare this detail with the silt fence installed on the site If the bottom of the fabric is not buried as shown on the detail, the inspector should note this on the report form

The fact sheets also list the specific maintenance tasks which are often triggered by some observation about the measure For example, the fact sheet for a silt fence states that accumulated sediment should be removed from the silt fence when it reaches a height of one third to one half the height of the fence Based upon this the inspector should measure the accumulated sediment on the silt fence at each inspection

There are primarily three things an inspector should look for when inspecting a pollution prevention measure They are: whether or not the measure was installed/performed correctly, whether or not there has been damage to the measure since it was installed or performed, and finally what should be done to correct any problems with the measure

Q: What should an inspector do with his/her observations?

An inspector should prepare a report documenting his/her findings (see Section 5.3). An inspector should request the required maintenance or repair for the pollution prevention measures, and if the Storm Water Pollution Prevention Plan should be changed to allow for unexpected conditions, then the inspector should make the changes or notify the appropriate person to make the changes.

5.2 MAINTENANCE

Maintenance of pollution prevention measures involves the upkeep and repair of the measures which have been installed to reduce pollution of storm water. Maintenance is important because the control measures you implement may be of little or no use if they have not been properly maintained. Good maintenance helps to insure that these measures are in proper working order when they are really needed under storm or spill conditions.

EPA BASELINE GENERAL PERMIT REQUIREMENTS
Definition of Maintenance
Part IV.D.3
Maintenance includes those procedures used to maintain in good and effective operating condition vegetation, erosion and sediment control measures, and other protective measures identified in the site plan.

Q: When do you perform maintenance?

Maintenance should be performed either on a interval specified in the pollution prevention plan or when the inspection finds that it is necessary for the measure to be effective. For example, if an inspector found that sediment had accumulated in a sediment trap to the depth of one half of its storage depth the inspector should request that the accumulated sediment be removed from the trap. Appropriate maintenance practices for erosion and sediment controls are discussed in the Fact Sheets in Appendix B.

Q: What types of activities can be included in maintenance activities for construction sites?

Maintenance activities for erosion and sediment controls are fairly basic. For example, sedimentation structures require removal (and proper disposal) of accumulated sediments to ensure effective trapping capacity This technique is also appropriate for temporary sediment traps, sediment basins, and silt fences.

5.3 RECORDKEEPING

It is important to document the inspection of the pollution prevention measures. These records can be used to request maintenance and repair and to prove that the inspection and maintenance were performed.

Q: What kinds of records should be kept for maintenance and inspection?

It is recommended that inspection and maintenance forms be prepared prior to the start of the construction activity. The inspection forms should be specific to the construction project and the Storm Water Pollution Prevention Plan. The forms should list each of the measures to be inspected on the site The form should include blanks for the inspector to fill in: his or her name, the date of inspection, the condition of the measure/area inspected, maintenance or repair performed and any changes which should be made to the Storm Water Pollution Prevention Plan to control or eliminate unforeseen pollution of storm water. (See Appendix C for a sample format)

The inspector could take a blank copy of the form and fill in the appropriate information as he/she inspected the site This would reduce the time spent preparing the report and would make sure that all the items requiring inspection are covered

5.4 TRAINING

The inspector of pollution prevention measures should understand what he/she is inspecting. Training and experience are the best way to develop an understanding for pollution prevention measures. Training inspection personnel will improve the chances for the Storm Water Pollution Prevention Plan to be effective.

Q: How should inspection personnel be trained?

Many States and organizations offer general training programs in sediment and erosion control This sort of training will be helpful The inspector should also have detailed knowledge about the site's Storm Water Pollution Prevention Plan particularly the following portions·

- The location and type of control measures
- The construction requirements for the control measures
- Maintenance procedures for each of the control measures
- Spill prevention and cleanup measures
- Inspection and maintenance recordkeeping requirements

5.5 SUMMARY

This Chapter has addressed a crucial part of the Storm Water Pollution Prevention Plan. Without inspection and maintenance of control measures, it is not likely that the measures will remain effective for long periods of time Without proper training of inspection staff and recordkeeping, it is difficult to determine what maintenance is required. Therefore, do not consider the pollution prevention plan to be something you do only at the beginning and end of a project. You should instead think of it as an ongoing process from start to completion.

CHAPTER 6

STORM WATER MANAGEMENT CONTROLS

A chapter describing the selection of storm water management controls will be published by EPA for insertion in this portion of the manual.

Consult your general permit to determine the measures necessary to fulfill the storm water management control requirement.

APPENDIX A

STORM WATER POLLUTION PREVENTION PLAN CHECKLISTS

EPA BASELINE CONSTRUCTION GENERAL PERMIT REQUIREMENTS PRE-CONSTRUCTION CHECKLIST

Storm Water Pollution Prevention Plans

1. A site description, including·
   - ☐ The nature of the activity?
   - ☐ Intended sequence of major construction activities
   - ☐ The total area of the site
   - ☐ The area of the site that is expected to undergo excavation
   - ☐ The runoff coefficient of the site after construction is complete
   - ☐ Existing soil or storm water data
   - ☐ A site map with
     - ☐ Drainage patterns
     - ☐ Approximate slopes after major grading
     - ☐ Area of soil disturbance
     - ☐ Outline of areas which won't be disturbed
     - ☐ Location of major structural and non-structural controls
     - ☐ Areas where stabilization practices are expected to occur
     - ☐ Surface waters
     - ☐ Storm water discharge locations
   - ☐ The name of the receiving water(s)
2. A description of controls
   - 2.1 Erosion and sediment controls, including
     - ☐ Stabilization practices for all areas disturbed by construction
     - ☐ Structural practices for all drainage/discharge locations
   - 2.2 Storm water management controls, including
     - ☐ Measures used to control pollutants occurring in storm water discharges after construction activities are complete.
     - ☐ Velocity dissipation devices to provide nonerosive flow conditions from the discharge point along the length of any outfall channel.
   - 2.3 Other controls including
     - ☐ Waste disposal practices which prevent discharge of solid materials to waters of the U S ?
     - ☐ Measures to minimize offsite tracking of sediments by construction vehicles
     - ☐ Measures to ensure compliance with State or local waste disposal, sanitary sewer, or septic system regulations
   - 2.4 ☐ Description of the timing during the construction when measures will be implemented
3. ☐ Are State or local requirements incorporated into the plans?
4. ☐ Are maintenance procedures for control measures identified in the plan?
5. ☐ Identification of allowable non-storm water discharges and pollution prevention measures
6. ☐ Contractor certification.
7. ☐ Plan certification

EPA BASELINE CONSTRUCTION GENERAL PERMIT CHECKLIST

Storm Water Pollution Prevention Plan Construction/Implementation Checklist

1. Maintain Records of Construction Activities, including:
   - ☐ Dates when major grading activities occur
   - ☐ Dates when construction activities temporarily cease on a portion of the site
   - ☐ Dates when construction activities permanently cease on a portion of the site
   - ☐ Dates when stabilization measures are initiated on the site
2. Prepare Inspection reports summarizing:
   - ☐ Name of inspector
   - ☐ Qualifications of inspector
   - ☐ Measures/areas inspected
   - ☐ Observed conditions
   - ☐ Changes necessary to the SWPPP
3. Report Releases of Reportable Quantities of Oil or Hazardous Materials (if they occur):
   - ☐ Notify National Response Center 800/424-8802 immediately
   - ☐ Notify permitting authority in writing within 14 days
   - ☐ Modify the pollution prevention plan to include:
     - the date of release
     - circumstances leading to the release
     - steps taken to prevent reoccurrence of the release
4. Modify Pollution Prevention Plan as necessary to:
   - ☐ Comply with minimum permit requirements when notified by EPA that the plan does not comply
   - ☐ Address a change in design, construction operation or maintenance which has an effect on the potential for discharge of pollutants
   - ☐ Prevent reoccurrence of reportable quantity releases of a hazardous material or oil

EPA BASELINE CONSTRUCTION GENERAL PERMIT CHECKLIST

Storm Water Pollution Prevention Plan Final Stabilization/Termination Checklist

1. ☐ All soil disturbing activities are complete
2. ☐ Temporary erosion and sediment control measures have been removed or will be removed at an appropriate time
3. ☐ All areas of the construction site not otherwise covered by a permanent pavement or structure have been stabilized with a uniform perennial vegetative cover with a density of 70% or equivalent measures have been employed

POLLUTION PREVENTION PLAN FOR STORM WATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITIES
EROSION AND SEDIMENT CONTROL SELECTION CHECKLIST

INSTRUCTIONS. THIS CHECKLIST LISTS THE MINIMUM SEDIMENT EROSION CONTROL REQUIREMENTS UNDER THE USEPA GENERAL PERMIT. CHECK [✓] EACH ITEM AND FILL IN THE BLANKS BELOW TO EVALUATE COMPLIANCE FOR EACH DRAINAGE AREA AND LOCATION. NOTE: THIS CHECKLIST WAS PREPARED FOR THE USEPA GENERAL PERMIT. REQUIREMENTS FOR STATE GENERAL PERMITS MAY VARY.

Stabilization Practices

☐ Stabilization will be initiated on all disturbed areas where construction activity will not occur for a period of more than 21 calendar days by the 14th day after construction activity has permanently or temporarily ceased.

Stabilization measures to be used include:

- ☐ Temporary Seeding
- ☐ Permanent Seeding
- ☐ Mulching
- ☐ Sod Stabilization
- ☐ Geotextiles
- ☐ Other ______________

Structural Practices

☐ Flows from upstream areas will be diverted from exposed soils. Measures to be used include

- ☐ Earth Dike
- ☐ Drainage Swale
- ☐ Interceptor Dike and Swale
- ☐ Pipe Slope Drain
- ☐ Other

Drainage locations serving less than 10 disturbed acres	Drainage locations serving 10 or more disturbed acres
☐ Sediment controls will be installed Sediment controls include ☐ Sediment Basin ☐ Sediment Trap ☐ Silt Fence or equivalent controls along all sideslope and downslope boundaries	☐ A Sediment Basin will be installed ☐ A Sediment Basin is not attainable on the site, therefore, the following sediment controls will be installed Sediment Trap Silt Fence or equivalent controls along the sideslope and downslope boundaries

Sediment Basin Runoff Storage Calculation

______ acres area draining to the sediment basin

X 3,600 cubic feet of storage/acre

=

______ cubic feet of storage required for the basin.

APPENDIX B

BMP FACT SHEETS

September 1992

Design Criteria

- Silt fences are appropriate at the following general locations
  - Immediately upstream of the point(s) of runoff discharge from a site before flow becomes concentrated (maximum design flow rate should not exceed 0.5 cubic feet per second).
  - Below disturbed areas where runoff may occur in the form of overland flow.
- Ponding should not be allowed behind silt fences since they will collapse under high pressure; the design should provide sufficient outlets to prevent overtopping.
- The drainage area should not exceed 0.25 acre per 100 feet of fence length.
- For slopes between 50:1 and 5:1, the maximum allowable upstream flow path length to the fence is 100 feet, for slopes of 2:1 and steeper, the maximum is 20 feet
- The maximum upslope grade perpendicular to the fence line should not exceed 1:1.
- Synthetic silt fences should be designed for 6 months of service, burlap is only acceptable for periods of up to 60 days

Materials

- Synthetic filter fabric should be a pervious sheet of polypropylene, nylon, polyester, or polyethylene yarn conforming to the requirements in Table 1 below

TABLE 1. SYNTHETIC FILTER FABRIC REQUIREMENTS

Physical Property	Requirements
Filtering Efficiency	75% - 85% (minimum)
Tensile Strength at 20% (maximum) Elongation	Standard Strength - 30 lb/linear inch (minimum)
	Extra Strength - 50 lb/linear inch (minimum)
Slurry Flow Rate	0 3 gal/ft^2/min (minimum)

- Synthetic filter fabric should contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 to 120°F.
- Burlap of 10 ounces per square yard of fabric can also be used.
- The filter fabric should be purchased in a continuous roll to avoid joints
- While not required, wire fencing may be used as a backing to reinforce standard strength filter fabric The wire fence (14 gauge minimum) should be at 22-48 inches wide and should have a maximum mesh spacing of 6 inches
- Posts should be 2-4 feet long and should be composed of either 2" x 2-4" pine (or equivalent) or 1.00 to 1.33 lb/linear ft steel. Steel posts should have projections for fastening wire and fabric to them

Construction Specifications

- The maximum height of the filter fence should range between 18 and 36 inches above the ground surface (depending on the amount of upslope ponding expected)

- ▲ Posts should be spaced 8 to 10 feet apart when a wire mesh support fence is used and no more than 6 feet apart when extra strength filter fabric (without a wire fence) is used. The posts should extend 12 to 30 inches into the ground.
- ▲ A trench should be excavated 4 to 8 inches wide and 4 to 12 inches deep along the upslope side of the line of posts.
- ▲ If standard strength filter fabric is to be used, the optional wire mesh support fence may be fastened to the upslope side of the posts using 1 inch heavy duty wire staples, tie wires, or hog rings. Extend the wire mesh support to the bottom of the trench. The filter fabric should then be stapled or wired to the fence, and 8 to 20 inches of the fabric should extend into the trench (Figure 1).
- ▲ Extra strength filter fabric does not require a wire mesh support fence. Staple or wire the filter fabric directly to the posts and extend 8 to 20 inches of the fabric into the trench (Figure 1).
- ▲ Where joints in the fabric are required, the filter cloth should be spliced together only at a support post, with a minimum 6-inch overlap, and securely sealed.
- ▲ Do not attach filter fabric to trees.
- ▲ Backfill the trench with compacted soil or 0 75 inch minimum diameter gravel placed over the filter fabric.

Maintenance

- ▲ Inspect filter fences daily during periods of prolonged rainfall, immediately after each rainfall event, and weekly during periods of no rainfall Make any required repairs immediately
- ▲ Sediment must be removed when it reaches one-third to one-half the height of the filter fence Take care to avoid damaging the fence during cleanout
- ▲ Filter fences should not be removed until the upslope area has been permanently stabilized. Any sediment deposits remaining in place after the filter fence has been removed should be dressed to conform with the existing grade, prepared, and seeded.

Cost

- ▲ Silt fence installation costs approximately $6.00 per linear foot.

Sources

- ▲ Commonwealth of Virginia - County of Fairfax, 1987. 1987 Check List For Erosion And Sediment Control - Fairfax County, Virginia.
- ▲ State of North Carolina, 1988. Erosion and Sediment Control Planning and Design Manual North Carolina Sedimentation Control Commission, Department of Natural Resources and Community Development.
- ▲ Maryland Department of the Environment, 1991. 1991 Maryland Standards And Specifications For Soil Erosion And Sediment Control - Draft

Design Criteria

- Pipe Slope Drains (PSD) are appropriate in the following general locations:
  - On cut or fill slopes before permanent storm water drainage structures have been installed
  - Where earth dikes or other diversion measures have been used to concentrate flows.
  - On any slope where concentrated runoff crossing the face of the slope may cause gullies, channel erosion, or saturation of slide-prone soils
  - As an outlet for a natural drainageway.
- The drainage area may be up to 10 acres; however, many jurisdictions consider 5 acres the recommended maximum.
- The PSD design should handle the peak runoff for the 10-year storm. Typical relationships between area and pipe diameter are shown in Table 2 below

TABLE 2. RELATIONSHIP BETWEEN AREA AND PIPE DIAMETER

Maximum Drainage Area (Acres)	Pipe Diameter (D) (Inches)
0 5	12
0 75	15
1.0	18

Materials

- Pipe may be heavy duty flexible tubing designed for this purpose, e g., nonperforated, corrugated plastic pipe, corrugated metal pipe, bituminous fiber pipe, or specially designed flexible tubing.
- A standard flared end section secured with a watertight fitting should be use for the inlet. A standard T-section fitting may also be used.
- Extension collars should be 12-inch long sections of corrugated pipe All fittings must be watertight.

Construction Specifications

- Place the pipe slope drain on undisturbed or well-compacted soil.
- Soil around and under the entrance section must be hand-tamped in 4-inch to 8-inch lifts to the top of the dike to prevent piping failure around the inlet
- Place filter cloth under the inlet and extend 5 feet in front of the inlet and be keyed in 6-inches on all sides to prevent erosion. A 6-inch metal toe plate may also be used for this purpose.
- Ensure firm contact between the pipe and the soil at all points by backfilling around and under the pipe with stable soil material hand compacted in lifts of 4-inches to 8-inches.
- Securely stake the PSD to the slope using grommets provided for this purpose at intervals of 10 feet or less.
- Ensure that all slope drain sections are securely fastened together and have watertight fittings.

- ▲ Extend the pipe beyond the toe of the slope and discharge at a nonerosive velocity into a stabilized area (e.g., rock outlet protection may be used) or to a sedimentation trap or pond.
- ▲ The PSD should have a minimum slope of 3 percent or steeper.
- ▲ The height at the centerline of the earth dike should range from a minimum of 1.0 foot over the pipe to twice the diameter of the pipe measured from the invert of the pipe It should also be at least 6 inches higher than the adjoining ridge on either side.
- ▲ At no point along the dike will the elevation of the top of the dike be less than 6 inches higher than the top of the pipe
- ▲ Immediately stabilize all areas disturbed by installation or removal of the PSD.

Maintenance

- ▲ Inspect regularly and after every storm. Make any necessary repairs.
- ▲ Check to see that water is not bypassing the inlet and undercutting the inlet or pipe. If necessary, install headwall or sandbags.
- ▲ Check for erosion at the outlet point and check the pipe for breaks or clogs Install additional outlet protection if needed and immediately repair the breaks and clean any clogs.
- ▲ Do not allow construction traffic to cross the PSD and do not place any material on it.
- ▲ If a sediment trap has been provided, clean it out when the sediment level reaches 1/3 to 1/2 the design volume.
- ▲ The PSD should remain in place until the slope has been completely stabilized or up to 30 days after permanent slope stabilization

Cost

- ▲ Pipe slope drain costs are generally based upon the pipe type and size (generally, flexible PVC at $5.00 per linear foot). Also adding to this cost are any expenses associated with inlet and outlet structures.

Sources

- ▲ Commonwealth of Virginia - County of Fairfax, 1987. 1987 Check List For Erosion And Sediment Control - Fairfax County, Virginia.
- ▲ State of North Carolina, 1988. Erosion and Sediment Control Planning and Design Manual. North Carolina Sedimentation Control Commission, Department of Natural Resources and Community Development.
- ▲ Maryland Department of the Environment, 1991. 1991 Maryland Standards And Specifications For Soil Erosion And Sediment Control - Draft.
- ▲ Storm Water Management Manual for the Puget Sound Basin. State of Washington, Department of Ecology, 1991.
- ▲ Cost Data:
  - ▲ Draft Sediment and Erosion Control, An Inventory of Current Practices, April 20, 1990. Prepared by Kamber Engineering for the U.S. Environmental Protection Agency, Office of Water Enforcement and Permits, Washington, D.C. 20460

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Design Criteria

- A Stabilized Construction Entrance (SCE) is appropriate in the following locations:
  - Wherever vehicles are leaving a construction site and enter onto a public road
  - At any unpaved entrance/exit location where there is risk of transporting mud or sediment onto paved roads.
- The width should be at least 10 feet to 12 feet or the as wide as the entire width of the access. At sites where traffic volume is high the entrance should be wide enough for two vehicles to pass safely.
- The length should be between 50 to 75 feet in length.
- Flare the entrance where it meets the existing road to provide a turning radius.
- Runoff from a stabilized construction entrance should drain to a sediment trap or sediment basin.
- Pipe placed under the entrance to handle runoff should be protected with a mountable berm.
- Dust control should be provided in accordance with Section 3.2.1.

Materials

- Crushed stone 2-inches-4-inches in diameter
- Geotextile (filter fabric) with the properties listed in Table 3 below.

TABLE 3. GEOTEXTILE REQUIREMENTS

Physical Property	Requirements
Grab Tensile Strength	220 lbs (ASTM D1682)
Elongation Failure	60 % (ASTM D1682)
Mullen Burst Strength	430 lbs. (ASTM D3768)
Puncture Strength	125 lbs. (ASTM D751) (modified)
Equivalent Opening	Size 40-80 (US std Sieve) (CW-02215)

Construction Specifications

- Clear all vegetation, roots and all other obstructions in preparation for grading.
- Prior to placing geotextile (filter fabric) make sure that the entrance is properly graded and compacted

- To reduce maintenance and loss of aggregate place geotextile fabric (filter cloth) over the existing ground before placing the stone for the entrance.
- Stone should be placed to a depth of 6-inches or greater for the entire width and length of the SCE.

Maintenance

- Inspect the measure on a regular basis and after there has been a high volume of traffic or storm event.
- Apply additional stone periodically and when repair is required.
- Immediately remove sediments or any other materials tracked onto the public roadway.
- Ensure that associated sediment control measures are in good working condition.

Cost

- Stabilized construction entrances cost ranges from $1,500 to $5,000 to install

Sources

- Commonwealth of Virginia - County of Fairfax, 1987. 1987 Check List For Erosion And Sediment Control - Fairfax County, Virginia.
- State of North Carolina, 1988. Erosion and Sediment Control Planning and Design Manual. North Carolina Sedimentation Control Commission, Department of Natural Resources and Community Development.
- Maryland Department of the Environment, 1991. 1991 Maryland Standards And Specifications For Soil Erosion And Sediment Control - Draft.
- Storm Water Management Manual for the Puget Sound Basin State of Washington, Department of Ecology, 1991.
- Cost Data:
  - Draft Sediment and Erosion Control, An Inventory of Current Practices, April 20, 1990. Prepared by Kamber Engineering for the U.S. Environmental Protection Agency, Office of Water Enforcement and Permits, Washington, D.C. 20460.

September 1992

Design Criteria

- Inlet protection is appropriate in the following locations
  - In small drainage areas (less than 1 acre) where the storm drain inlet is functional before the drainage area has been permanently stabilized
  - Where there is danger of sediment silting in an inlet which is in place prior to permanent stabilization
- Filter fabric inlet protection is appropriate for most types of inlets where the drainage area is one acre or less
- The drainage area should be fairly flat with slopes of 5% or less and the area immediately surrounding the inlet should not exceed a slope of 1%.
- Overland flow to the inlet should be no greater than 0.5 cfs
- This type of inlet protection is not appropriate for use in paved areas because the filter fabric requires staking
- To avoid failure caused by pressure against the fabric when overtopping occurs, it is recommended that the height of the filter fabric be limited to 1.5 feet above the crest of the drop inlet
- It is recommended that a sediment trapping sump of 1 to 2 feet in depth with side slopes of 2:1 be provided.

Materials

- Filter fabric (see the fabric specifications for silt fence).
- Wooden stakes 2" x 2" or 2"x 4" with a minimum length of 3 feet
- Heavy-duty wire staples at least ½ inch in length.
- Washed gravel ¾ inches in diameter

Construction Specifications

- Place a stake at each corner of the inlet and around the edges at no more than 3 feet apart. Stakes should be driven into the ground 18 inches or at a minimum 8 inches.
- For stability a framework of wood strips should be installed around the stakes at the crest of the overflow area 1.5 feet above the crest of the drop inlet
- Excavate a trench of 8 inches to 12 inches in depth around the outside perimeter of the stakes If a sediment trapping sump is being provided then the excavation may be as deep as 2 feet.
- Staple the filter fabric to the wooden stakes with heavy-duty staples, overlapping the joints to the next stake Ensure that between 12 inches to 32 inches of filter fabric extends at the bottom so it can be formed into the trench.
- Place the bottom of the fabric in the trench and backfill the trench all the way around using washed gravel to a minimum depth of 4 inches.

Maintenance

- Inspect regularly and after every storm. Make any repairs necessary to ensure the measure is in good working order.
- Sediment should be removed and the trap restored to its original dimensions when sediment has accumulated to ½ the design depth of the trap.
- If the filter fabric becomes clogged it should be replaced immediately.
- Make sure that the stakes are firmly in the ground and that the filter fabric continues to be securely anchored.
- All sediments removed should be properly disposed.
- Inlet protection should remain in place and operational until the drainage area is completely stabilized or up to 30 days after the permanent site stabilization is achieved.

Cost

- The cost of storm drain inlet protection varies dependent upon the size and type of inlet to be protected but generally is about $300.00 per inlet

Sources

- Commonwealth of Virginia - County of Fairfax, 1987. 1987 Check List For Erosion And Sediment Control - Fairfax County, Virginia.
- State of North Carolina, 1988 Erosion and Sediment Control Planning and Design Manual. North Carolina Sedimentation Control Commission, Department of Natural Resources and Community Development.
- Maryland Department of the Environment, 1991. 1991 Maryland Standards And Specifications For Soil Erosion And Sediment Control - Draft.
- Storm Water Management Manual for the Puget Sound Basin State of Washington, Department of Ecology, 1991.
- Cost Data:
  - Draft Sediment and Erosion Control, An Inventory of Current Practices, April 20, 1990. Prepared by Kamber Engineering for the U.S. Environmental Protection Agency, Office of Water Enforcement and Permits, Washington, D.C. 20460

EXCAVATED GRAVEL INLET PROTECTION

September 1992

Design Criteria

- Inlet protection is appropriate in the following locations:
  - In small drainage areas (less than 1 acre) where the storm drain inlet is functional before the drainage area has been permanently stabilized.
  - Where there is danger of sediment silting in an inlet which is in place prior to permanent stabilization.
  - Where ponding around the inlet structure could be a problem to traffic on site.

- Excavated gravel and mesh inlet protection may be used with most inlets where overflow capability is needed and in areas of heavy flows, 0.5 cfs or greater.
- The drainage area should not exceed 1 acre
- The drainage area should be fairly flat with slopes of 5% or less.
- The trap should have a sediment trapping sump of 1 to 2 feet measured from the crest of the inlet. Side slopes should be 2 1. The recommended volume of excavation is 35 yd^3/acre disturbed.
- To achieve maximum trapping efficiency the longest dimension of the basin should be oriented toward the longest inflow area

Materials

- Hardware cloth or wire mesh with ½ inch openings.
- Filter fabric (see the fabric specifications for silt fence)
- Washed gravel ¾ inches to 4 inches in diameter

Construction Specifications

- Remove any obstructions to excavating and grading Excavate sump area, grade slopes and properly dispose of soil
- The inlet grate should be secured to prevent seepage of sediment laden water.
- Place wire mesh over the drop inlet so that the wire extends a minimum of 1 foot beyond each side of the inlet structure Overlap the strips of mesh if more than one is necessary.
- Place filter fabric over the mesh extending it at least 18 inches beyond the inlet opening on all sides. Ensure that weep holes in the inlet structure are protected by filter fabric and gravel.
- Place stone/gravel over the fabric/wire mesh to a depth of at least 1 foot

EXCAVATED GRAVEL INLET PROTECTION

Maintenance

- Inspect regularly and after every storm. Make any repairs necessary to ensure the measure is in good working order.
- Sediment should be removed and the trap restored to its original dimensions when sediment has accumulated to ½ the design depth of the trap.
- Clean or remove and replace the stone filter or filter fabric if they become clogged.
- Inlet protection should remain in place and operational until the drainage area is completely stabilized or up to 30 days after the permanent site stabilization is achieved.

Cost

- The cost of storm drain inlet protection varies dependent upon the size and type of inlet to be protected but generally is about $300.00 per inlet.

Sources

- Commonwealth of Virginia - County of Fairfax, 1987. 1987 Check List For Erosion And Sediment Control - Fairfax County, Virginia.
- State of North Carolina, 1988 Erosion and Sediment Control Planning and Design Manual. North Carolina Sedimentation Control Commission, Department of Natural Resources and Community Development.
- Maryland Department of the Environment, 1991. 1991 Maryland Standards And Specifications For Soil Erosion And Sediment Control - Draft.
- Storm Water Management Manual for the Puget Sound Basin. State of Washington, Department of Ecology, 1991.
- Cost Data:
  - Draft Sediment and Erosion Control, An Inventory of Current Practices, April 20, 1990. Prepared by Kamber Engineering for the U.S Environmental Protection Agency, Office of Water Enforcement and Permits, Washington, D.C. 20460.

BLOCK AND GRAVEL INLET PROTECTION

September 1992

Design Criteria

- Inlet protection is appropriate in the following locations:
  - In drainage areas (less than 1 acre) where the storm drain inlet is functional before the drainage area has been permanently stabilized.
  - Where there is danger of sediment silting in an inlet which is in place prior to permanent stabilization.
- Block and gravel inlet protection may be used with most types of inlets where overflow capability is needed and in areas of heavy flows 0.5 cfs or greater.
- The drainage area should not exceed 1 acre
- The drainage area should be fairly flat with slopes of 5% or less.
- To achieve maximum trapping efficiency the longest dimension of the basin should be oriented toward the longest inflow area.
- Where possible the trap should have sediment trapping sump of 1 to 2 feet in depth with side slopes of 2.1.
- There are several other types of inlet protection also used to prevent siltation of storm drainage systems and structures during construction, they are
  - Filter Fabric Inlet Protection
  - Excavated Gravel Inlet Protection

Materials

- Hardware cloth or wire mesh with ½ inch openings
- Filter fabric (see the fabric specifications for silt fence)
- Concrete block 4 inches to 12 inches wide
- Washed gravel ¾ inches to 4 inches in diameter

Construction Specifications

- The inlet grate should be secured to prevent seepage of sediment laden water.
- Place wire mesh over the drop inlet so that the wire extends a minimum of 12 inches to 18 inches beyond each side of the inlet structure. Overlap the strips of mesh if more than one is necessary.
- Place filter fabric (optional) over the mesh and extend it at least 18 inches beyond the inlet structure
- Place concrete blocks over the filter fabric in a single row lengthwise on their sides along the sides of the inlet The foundation should be excavated a minimum of 2 inches below the crest of the inlet and the bottom row of blocks should be against the edge of the structure for lateral support.
- The open ends of the block should face outward not upward and the ends of adjacent blocks should abut Lay one block on each side of the structure on its side to allow for dewatering of the pool
- The block barrier should be at least 12 inches high and may be up to a maximum of 24 inches high and may be from 4 inches to 12 inches in depth depending on the size of block used.
- Prior to backfilling, place wire mesh over the outside vertical end of the blocks so that stone does not wash down the inlet.
- Place gravel against the wire mesh to the top of the blocks

Maintenance

- Inspect regularly and after every storm. Make any repairs necessary to ensure the measure is in good working order.
- Sediment should be removed and the trap restored to its original dimensions when sediment has accumulated to ½ the design depth of the trap.
- All sediments removed should be properly disposed of.
- Inlet protection should remain in place and operational until the drainage area is completely stabilized or up to 30 days after the permanent site stabilization is achieved.

Cost

- The cost of storm drain inlet protection varies dependent upon the size and type of inlet to be protected but generally is about $300.00 per inlet.

Sources

- Commonwealth of Virginia - County of Fairfax, 1987. 1987 Check List For Erosion And Sediment Control - Fairfax County, Virginia.
- State of North Carolina, 1988 Erosion and Sediment Control Planning and Design Manual. North Carolina Sedimentation Control Commission, Department of Natural Resources and Community Development.
- Maryland Department of the Environment, 1991 1991 Maryland Standards And Specifications For Soil Erosion And Sediment Control - Draft
- Storm Water Management Manual for the Puget Sound Basin. State of Washington, Department of Ecology, 1991.
- Cost Data:
  - Draft Sediment and Erosion Control, An Inventory of Current Practices, April 20, 1990. Prepared by Kamber Engineering for the U.S. Environmental Protection Agency, Office of Water Enforcement and Permits, Washington, D.C 20460.

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Design Criteria

- Check dams are appropriate for use in the following locations:
  - Across swales or drainage ditches to reduce the velocity of flow.
  - Where velocity must be reduced because a vegetated channel lining has not yet been established.
- Check dams may never be used in a live stream unless approved by the appropriate government agency.
- The drainage area above the check dam should be between 2 acres and 10 acres.
- The dams must be spaced so that the toe of the upstream dam is never any higher than the top of the downstream dam.
- The center of the dam must be 6 inches to 9 inches lower than either edge, and the maximum height of the dam should be 24 inches.
- The check dam should be as much as 18 inches wider than the banks of the channel to prevent undercutting as overflow water re-enters the channel.
- Excavating a sump immediately upstream from the check dam improves its effectiveness.
- Provide outlet stabilization below the lowest check dam where the risk of erosion is greatest.
- Consider the use of channel linings or protection such as plastic sheeting or riprap where there may be significant erosion or prolonged submergence

Materials

- Stone 2 inches to 15 inches in diameter
- Logs 6 inches to 8 inches in diameter
- Sandbags filled with pea gravel
- Filter fabric (see the fabric specifications for silt fence)

Construction Specifications

- Rock Check Dams
  - Place the stones on the filter fabric either by hand or using appropriate machinery; do not simply dump them in place
  - Extend the stone 18 inches beyond the banks and keep the side slopes 2:1 or flatter.
  - Lining the upstream side of the dam with ¾ inch to 1¼ inch gravel 1 foot in depth is a suggested option.
- Log Check Dams
  - Logs must be firmly embedded in the ground; 18 inches is the recommended minimum depth.
- Sand Bag Check Dams
  - Be sure that bags are all securely sealed.
  - Place bags by hand or use appropriate machinery.

Maintenance

- Inspect regularly and after every storm. Make any repairs necessary to ensure the measure is in good working order.
- Accumulated sediment and leaves should be removed from behind the dams and erosive damage to the channel restored after each storm or when ½ the original height of the dam is reached.
- All accumulated material removed from the dam shall be properly disposed
- Replace stone as necessary for the dams to maintain their correct height.
- If sand bags are used, the fabric of the bags should be inspected for signs of deterioration.
- Remove stone or riprap if grass lined channel requires mowing.
- Check dams should remain in place and operational until the drainage area and channel are completely stabilized or up to 30 days after the permanent site stabilization is achieved.
- Restore the channel lining or establish vegetation when each check dam is removed.

Cost

- The costs for the construction of check dams varies with the material used. Rock costs about $100 per dam. Log check dams are usually slightly less expensive than rock check dams All costs vary depending on the width of channel to be checked.

Sources

- Commonwealth of Virginia - County of Fairfax, 1987. 1987 Check List For Erosion And Sediment Control - Fairfax County, Virginia.
- State of North Carolina, 1988. Erosion and Sediment Control Planning and Design Manual. North Carolina Sedimentation Control Commission, Department of Natural Resources and Community Development.
- Maryland Department of the Environment, 1991. 1991 Maryland Standards And Specifications For Soil Erosion And Sediment Control - Draft.
- Storm Water Management Manual for the Puget Sound Basin State of Washington, Department of Ecology, 1991.
- Cost Data:
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Design Criteria

- Earth dikes are appropriate in the following situations:
  - To divert upslope flows away from disturbed areas such as cut or fill slopes and to divert runoff to a stabilized outlet
  - To reduce the length of the slope runoff will cross
  - At the perimeter of the construction site to prevent sediment-laden runoff from leaving the site
  - To direct sediment-laden runoff to a sediment trapping device.
- When the drainage area to the earth dike is greater than 10 acres, the United States Department of Agriculture - Soil Conservation Service (USDA - SCS) standards and specification for diversions should be consulted
- Table 4 contains suggested dike design criteria.

TABLE 4. SUGGESTED DIKE DESIGN CRITERIA

Drainage Area	Under 5 Acres	Between 5-10 Acres
Dike Height	18 inches	30 inches
Dike Width	24 inches	36 inches
Flow Width	4 feet	6 feet
Flow Depth	12 inches	24 inches
Side Slopes	2:1 or less	2:1 or less
Grade	0.5% - 10%	0.5% - 10%

- The base for a dike 18 inches high and 24 wide at the top should be between 6 feet - 8 feet. The height of the dike is measured on the upslope side
- If the dike is constructed using coarse aggregate the side slopes should be 3:1 or flatter.
- The channel formed behind the dike should have a positive grade to a stabilized outlet. The channel should be stabilized with vegetative or other stabilization measures
- Grades over 10% may require an engineering design.
- Construct the dike where it will not interfere with major areas of construction traffic so that vehicle damage to the dike will be kept to the minimum.
- Diversion dikes should be installed prior to the majority of soil disturbing activity, and may be removed when stabilization of the drainage area and outlet are complete.

Materials

- Compacted Soil
- Coarse Aggregate

Construction Specifications

- Clear the area of all trees, brush, stumps or other obstructions.
- Construct the dike to the designed cross-section, line and grade making sure that there are no irregularities or bank projections to impede the flow.
- The dike should be compacted using earth moving equipment to prevent failure of the dike.
- The dike must be stabilized as soon as possible after installation.

Maintenance

- Inspect regularly and after every storm, make any repairs necessary to ensure the measure is in good working order.
- Inspect the dike, flow channel and outlet for deficiencies or signs of erosion.
- If material must be added to the dike be sure it is properly compacted.
- Reseed or stabilize the dike as needed to maintain its stability regardless if there has been a storm event or not.

Cost

- The cost associated with earth dike construction is roughly $4.50 per linear foot which covers the earthwork involved in preparing the dike Also added to this cost is approximately $1.00 per linear foot for stabilization practices. It should be noted that for most construction projects, the cost of earth dike construction is insignificant compared to the overall earthwork project costs.

Sources

- Commonwealth of Virginia - County of Fairfax, 1987. 1987 Check List For Erosion And Sediment Control - Fairfax County, Virginia
- State of North Carolina, 1988. Erosion and Sediment Control Planning and Design Manual. North Carolina Sedimentation Control Commission, Department of Natural Resources and Community Development.
- Maryland Department of the Environment, 1991. 1991 Maryland Standards And Specifications For Soil Erosion And Sediment Control - Draft.
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Design Criteria

- Temporary drainage swales are appropriate in the following situations
  - To divert upslope flows away from disturbed areas such as cut or fill slopes and to divert runoff to a stabilized outlet
  - To reduce the length of the slope runoff will cross
  - At the perimeter of the construction site to prevent sediment-laden runoff from leaving the site
  - To direct sediment-laden runoff to a sediment trapping device.
- When the drainage area is greater than 10 acres the United States Department of Agriculture - Soil Conservation Service (USDA - SCS) standards and specifications for diversions should be consulted.
- Swales may have side slopes ranging from 3:1 to 2:1.
- The minimum channel depth should be between 12 inches and 18 inches.
- The minimum width at the bottom of the channel should be 24 inches and the bottom should be level.
- The channel should have a uniform positive grade between 2% and 5%, with no sudden decreases where sediments may accumulate and cause overtopping
- The channel should be stabilized with temporary or permanent stabilization measures
- Grades over 10% may require an engineering design.
- Construct the swale away from areas of major construction traffic.
- Runoff must discharge to a stabilized outlet.

Materials

- Grass seed for temporary or permanent stabilization
- Sod
- Coarse aggregate or riprap

Construction Specifications

- Clear the area of all trees, brush, stumps or other obstructions
- Construct the swale to the designed cross-section, line and grade making sure that there are no irregularities or bank projections to impede the flow
- The lining should be well compacted using earth moving equipment and stabilization initiated as soon as possible.
- Stabilize lining with grass seed, sod, or riprap.
- Surplus material should be properly distributed or disposed of so that it does not interfere with the functioning of the swale.
- Outlet dissipation measures should be used to avoid the risk of erosion.

Maintenance

- Inspect regularly and after every storm, make any repairs necessary to ensure the measure is in good working order.
- Inspect the flow channel and outlet for deficiencies or signs of erosion.
- If surface of the channel requires material to be added be sure it is properly compacted.
- Reseed or stabilize the channel as needed to prevent erosion during a storm event.

Cost

- Drainage swale can vary widely depending on the geometry of the swale and the type of lining material:

    - Grass $3.00/square yard
    - Sod $4.00/square year
    - Riprap $45.00/square year

- No matter which liner type is used, the entire swale must be stabilized (i.e., seeded and mulched at a cost of $1.25/square yard).

Sources

- Commonwealth of Virginia - County of Fairfax, 1987. 1987 Check List For Erosion And Sediment Control - Fairfax County, Virginia
- State of North Carolina, 1988. Erosion and Sediment Control Planning and Design Manual North Carolina Sedimentation Control Commission, Department of Natural Resources and Community Development.
- Maryland Department of the Environment, 1991 1991 Maryland Standards And Specifications For Soil Erosion And Sediment Control - Draft.
- Storm Water Management Manual for the Puget Sound Basin State of Washington, Department of Ecology, 1991.
- Cost Data·

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Design Criteria

- Temporary sediment traps are appropriate in the following locations.
  - At the outlet of the perimeter controls installed during the first stage of construction
  - At the outlet of any structure which concentrates sediment-laden runoff, e g at the discharge point of diversions, channels, slope drains, or other runoff conveyances
  - Above a storm water inlet that is in line to receive sediment-laden runoff.
- Temporary sediment traps may be constructed by excavation alone or by excavation in combination with an embankment.
- Temporary sediment traps are often used in conjunction with a diversion dike or swale.
- The drainage area for the sediment trap should not exceed 5 disturbed acres.
- The trap must be accessible for ease of regular maintenance which is critical to its functioning properly.
- Sediment traps are temporary measures and should not be planned to remain in place longer than between 18 and 24 months.
- The capacity of the sedimentation pool should provide storage volume for 3,600 cubic feet/acre drainage area
- The outlet should be designed to provide a 2 foot settling depth and an additional sediment storage area 1½ feet deep at the bottom of the trap.
- The embankment may not exceed 5 feet in height.
- The recommended minimum width at the top of the embankment is between 2 feet and 5 feet.
- The minimum recommended length of the weir is between 3 feet and 4 feet, and the maximum is 12 feet in length
- Table 5 illustrates the typical relationship between the embankment height, the height of the outlet (H_o), and the width (W) at the top of the embankment.

TABLE 5. EMBANKMENT HEIGHT vs. OUTLET HEIGHT AND WIDTH

H	H_o	W
1.5	0.5	2.0
2 0	1.0	2.0
2.5	1.5	2 5
3.0	2.0	2.5
3.5	2.5	3.0
4.0	3.0	3.0
4.5	3.5	4.0
5.0	4.0	4.5

Materials

- Filter fabric (see fabric requirement for silt fence)
- Coarse aggregate or riprap 2 inches to 14 inches in diameter
- Washed gravel ¾ to 1½ inches in diameter
- Seed and mulch for stabilization

Construction Specifications

- Clear the area of all trees, brush, stumps or other obstructions
- Construct the embankment in 8 inch lifts compacting each lift with the appropriate earth moving equipment Fill material must be free of woody vegetation, roots, or large stones.
- Keep cut and fill slopes between 3 1 and 2:1 or flatter.
- Line the outlet area with filter fabric prior to placing stone or gravel
- Construct the gravel outlet using heavy stones between 6 inches and 14 inches in diameter and face the upstream side with a 12 inch layer of ¾ inch to 1½ inch washed gravel on the upstream side
- Seed and mulch the embankment as soon as possible to ensure stabilization

Maintenance

- Inspect regularly and after every storm Make any repairs necessary to ensure the measure is in good working order.
- Frequent removal of sediment is critical to the functioning of this measure At a minimum sediment should be removed and the trap restored to its original volume when sediment reaches ½ of the original volume.
- Sediment removed from the trap must be properly disposed
- Check the embankment regularly to make sure it is structurally sound.

Cost

- Costs for a sediment trap vary widely based upon their size and the amount of excavation and stone required, they usually can be installed for $500 to $7,000.

Sources

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- Maryland Department of the Environment, 1991. 1991 Maryland Standards And Specifications For Soil Erosion And Sediment Control - Draft.
- Storm Water Management Manual for the Puget Sound Basin. State of Washington, Department of Ecology, 1991.
- Cost Data:
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APPENDIX C

EXAMPLE STORM WATER POLLUTION PREVENTION PLAN FOR A CONSTRUCTION ACTIVITY

HOMERVILLE APARTMENTS
CONSTRUCTION POLLUTION PREVENTION PLAN

SITE DESCRIPTION

oject Name and ɔcation: (Latitude, ɔngitude, or Address)	Homerville Apartments 21 Broadview Avenue Center City, ANY STATE 00000	Owner Name and Address:	Quality Associates 11 Main Street Center City, ANY STATE 00000

scription: (Purpose d Types of Soil sturbing Activities)

ıis project will consist of three low-rise, attached apartment buildings with adjacent parking facilities.

ɔil disturbing activities will include clearing and grubbing; installing a stabilized construction entrance, rimeter, and other erosion and sediment controls, grading, excavation for the sedimentation pond, storm ·wer, utilities, and building foundations, construction of curb and gutter, road, and parking areas; and eparation for final planting and seeding.

ınoff Coefficient:	The final coefficient of runoff for the site will be c = 0.5
e Area:	The site is approximately 11 0 acres of which 9.8 acres will be disturbed by construction activities

quence of Major Activities

ıe order of activities will be as follows.

- Install stabilized construction entrance
- Clear and grub for earth dike and sediment basin
- Install earth dike
- Construct sedimentation basin
- Continue clearing and grading
- Pile topsoil
- Stabilize denuded areas and stockpiles within 14 days of last construction activity in that area
- Install utilities, storm sewer, curb and gutter

9. Apply stone to parking area and road
10. Construct apartment buildings
11. Complete grading and install permanent seeding and plantings
12 Complete final paving
13. Remove accumulated sediment from basin.
14. When all construction activity is complete and the site is stabilized, remove earth dike and reseed any areas disturbed by their removal.

me of Receiving 'aters:	The entire site will drain into Rocky Creek which is approximately one hundred yards from the site.

CONTROLS

Erosion and Sediment Controls

Stabilization Practices

mporary Stabilization - Top soil stock piles and disturbed portions of the site where construction activity mporarily ceases for at least 21 days will be stabilized with temporary seed and mulch no later than 14 days om the last construction activity in that area The temporary seed shall be Rye (grain) applied at the rate of 20 pounds per acre. Prior to seeding, 2,000 pounds of ground agricultural limestone and 1,000 pounds of)-10-10 fertilizer shall be applied to each acre to be stabilized After seeding, each area shall be mulched 'ith 4,000 pounds per acre of straw. The straw mulch is to be tacked into place by a disk with blades set arly straight. Areas of the site which are to be paved will be temporarily stabilized by applying geotextile ıd stone sub-base until bituminous pavement can be applied.

'rmanent Stabilization - Disturbed portions of the site where construction activities permanently ceases shall stabilized with permanent seed no later than 14 days after the last construction activity. The permanent ed mix shall consist of 80 lbs/acre tall fescue, and 40 lbs/acre kobe lespedeza. Prior to seeding, 4,000 ɔunds of ground agricultural limestone and 2,000 pounds of 10-10-10 fertilizer shall be applied to each acre) be stabilized. After seeding, each area shall be mulched with 4,000 pounds per acre of straw. The straw ulch is to be tacked into place by a disk with blades set nearly straight.

CONTROLS (Continued)

Structural Practices

Earth Dike - will be constructed along the uphill perimeter (north) of the site A portion of the dike will divert runon around the construction site. The remaining portion of the dike will collect runoff from the disturbed area and direct the runoff to the sediment basin.

Sediment Basin - will be constructed at the common drainage location on the south side of the construction site. The basin will be formed by constructing an embankment across an existing gully and excavating a storage pond with a volume of 36,000 cubic feet (0.82) acre feet The basin will drain through a corrugated metal riser and outlet pipe to a rip rap outlet apron. Once construction activities are nearly complete, the accumulated sediment will be removed from the basin.

Storm Water Management

Storm water drainage will be provided by curb and gutter, storm sewer and catch basin, for the developed areas. The areas which are not developed will be graded at less that 0.5:1 and have permanent seeding or plantings. Two acres of the site will remain untouched and in its natural state. When construction is complete the entire site will drain to a wet detention basin. The wet detention basin will be in the location of the temporary sediment basin. When upslope areas are stabilized, the accumulated sediment will be removed from the sediment basin, and the areas on the sides of the basin will be planted with vegetation The wet detention pond is designed with a permanent pool volume of 0.82 (acre-feet). This is equivalent to one inch of runoff for the entire drainage area. It is expected that this wet detention pond design will result in an 80 percent removal of total suspended solids from the site's storm water runoff. The pond has been designed by a professional engineer to keep peak flow rates from the two and ten year/24 hour storms at their pre-development rates. The outlet of the detention basin will be stabilized by a riprap apron.

OTHER CONTROLS

Waste Disposal:

Waste Materials

All waste materials will be collected and stored in a securely lidded metal dumpster rented from the ADF Waste Management Company, which is a licensed solid waste management company in Center City The dumpster will meet all local Center City and any State solid waste management regulations All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied a minimum of twice per week or more often if necessary, and the trash will be hauled to the Center City Dump. No construction waste materials will be buried onsite All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer and Mr Doe, the individual who manages the day-to-day site operations, will be responsible for seeing that these procedures are followed.

Hazardous Waste

All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and Mr. Doe, the individual who manages day-to-day site operations, will be responsible for seeing that these practices are followed.

Sanitary Waste

All sanitary waste will be collected from the portable units a minimum of three times per week by the TIDEE Company, a licensed Center City sanitary waste management contractor, as required by local regulation.

Offsite Vehicle Tracking:

A stabilized construction entrance has been provided to help reduce vehicle tracking of sediments. The paved street adjacent to the site entrance will be swept daily to remove any excess mud, dirt or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

TIMING OF CONTROLS/MEASURES

indicated in the Sequence of Major Activities, the earth dike, stabilized construction entrance and sediment sin will be constructed prior to clearing or grading of any other portions of the site Areas where nstruction activity temporarily ceases for more than 21 days will be stabilized with a temporary seed and ılch within 14 days of the last disturbance Once construction activity ceases permanently in an area, that a will be stabilized with permanent seed and mulch. After the entire site is stabilized, the accumulated diment will be removed from the trap and the earth dike will be removed

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS

e storm water pollution prevention plan reflects Center City requirements for storm water management and osion and sediment control, as established in Center City ordinance 5-188. To ensure compliance, this plan s prepared in accordance with the Center City Storm Water Management, Erosion and Sediment Control ndbook, published by the Center City Department of Planning, Storm Water Management Section. There are other applicable State or Federal requirements for sediment and erosion site plans (or permits), or storm ter management site plans (or permits)

MAINTENANCE/INSPECTION PROCEDURES

Erosion and Sediment Control Inspection and Maintenance Practices

ese are the inspection and maintenance practices that will be used to maintain erosion and sediment ntrols

- Less than one half of the site will be denuded at one time
- All control measures will be inspected at least once each week and following any storm event of 0.5 inches or greater.
- All measures will be maintained in good working order, if a repair is necessary, it will be initiated within 24 hours of report
- Built up sediment will be removed from silt fence when it has reached one-third the height of the fence.
- Silt fence will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground
- The sediment basin will be inspected for depth of sediment, and built up sediment will be removed when it reaches 10 percent of the design capacity or at the end of the job
- Diversion dike will be inspected and any breaches promptly repaired
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth
- A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached
- Mr. Doe, site superintendent, will select three individuals who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance report
- Personnel selected for inspection and maintenance responsibilities will receive training from Mr. Doe. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order

MAINTENANCE/INSPECTION PROCEDURES (Continued)

Non-Storm Water Discharges

It is expected that the following non-storm water discharges will occur from the site during the construction period:

- Water from water line flushings.
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).
- Uncontaminated groundwater (from dewatering excavation).

All non-storm water discharges will be directed to the sediment basin prior to discharge.

INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be present onsite during construction:

- Concrete
- Detergents
- Paints (enamel and latex)
- Metal Studs
- Concrete
- Tar
- Fertilizers
- Petroleum Based Products
- Cleaning Solvents
- Wood
- Masonry Block
- Roofing Shingles.

SPILL PREVENTION

Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff.

Good Housekeeping:

The following good housekeeping practices will be followed onsite during the construction project.

- An effort will be made to store only enough product required to do the job
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer's label
- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of a product will be used up before disposing of the container
- Manufacturers' recommendations for proper use and disposal will be followed
- The site superintendent will inspect daily to ensure proper use and disposal of materials onsite

Hazardous Products:

These practices are used to reduce the risks associated with hazardous materials.

- Products will be kept in original containers unless they are not resealable
- Original labels and material safety data will be retained, they contain important product information
- If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed

SPILL PREVENTION (Continued)

Product Specific Practices

The following product specific practices will be followed onsite.

Petroleum Products:

All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled Any asphalt substances used onsite will be applied according to the manufacturer's recommendations

Fertilizers:

Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills

Paints:

All containers will be tightly sealed and stored when not required for use Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to manufacturers' instructions or State and local regulations

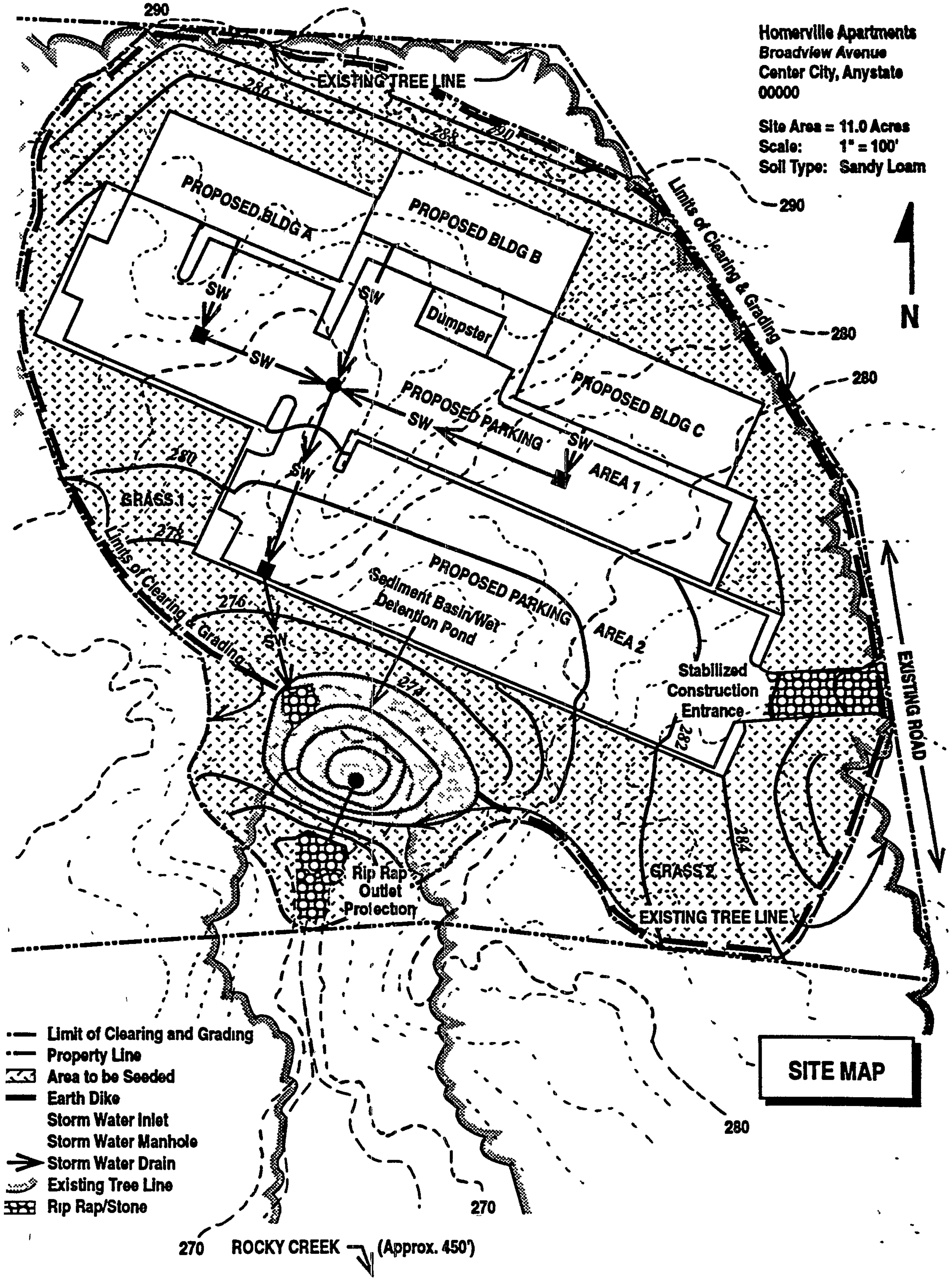
Concrete Trucks:

Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site

Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size
- The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one A description of the spill, what caused it, and the cleanup measures will also be included.
- Mr. Doe, the site superintendent responsible for the day-to-day site operations, will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training These individuals will each become responsible for a particular phase of prevention and cleanup The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite


Homerville Apartments
Broadview Avenue
Center City, Anystate
00000
Site Area = 11.0 Acres
Scale: 1" = 100'
Soil Type: Sandy Loam
N
EXISTING TREE LINE
PROPOSED BLDG A
PROPOSED BLDG B
PROPOSED BLDG C
Dumpster
PROPOSED PARKING
AREA 1
PROPOSED PARKING
AREA 2
SW
Sediment Basin/Wet Detention Pond
GRASS 1
GRASS 2
Limits of Clearing & Grading
Stabilized Construction Entrance
EXISTING ROAD
Rip Rap Outlet Protection
EXISTING TREE LINE
290
286
288
280
278
276
274
282
284
270
SITE MAP
Limit of Clearing and Grading
Property Line
Area to be Seeded
Earth Dike
Storm Water Inlet
Storm Water Manhole
Storm Water Drain
Existing Tree Line
Rip Rap/Stone
ROCKY CREEK (Approx. 450')

POLLUTION PREVENTION PLAN 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 gathered and evaluated 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.

Signed:______________________

John R. Quality,
President
Quality Associates

Date:______________________

CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification

Signature	For	Responsible for
__________ Joseph Contractor, President Date:__________	Center City Const., Inc. 21 Elm Street Center City, Any State 00000 (123) 399-8765	General Contractor
__________ John Planter Vice President of Construction Date:__________	Green Grass, Inc. 4233 Center Road Outerville, Any State 00001 (123) 823-5678	Temporary and Permanent Stabilization
__________ Jim Kay, President Date:__________	Dirt Movers, Inc. 523 Lincoln Ave. Outerville, Any State 00001 (123) 823-8921	Stabilized Construction Entrance, Earth Dikes, Sediment Basin

HOMERVILLE APARTMENTS

STORM WATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT FORM

TO BE COMPLETED EVERY 7 DAYS AND WITHIN 24 HOURS OF
A RAINFALL EVENT OF 0.5 INCHES OR MORE

INSPECTOR:________________________ DATE:______________________________

INSPECTOR'S QUALIFICATIONS.

____

____

____

____

DAYS SINCE LAST RAINFALL __________ AMOUNT OF LAST RAINFALL ______ INCHES

STABILIZATION MEASURES

AREA	DATE SINCE LAST DISTURBED	DATE OF NEXT DISTURBANCE	STABILIZED? (YES/NO)	STABILIZED WITH	CONDITION
BLDG A					
BLDG. B					
BLDG C					
PRKNG 1					
PRKNG. 2					
GRASS 1					
GRASS 2					

STABILIZATION REQUIRED

____

____

____

____

TO BE PERFORMED BY ________________________ ON OR BEFORE:__________________________

HOMERVILLE APARTMENTS

STORM WATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT FORM

STRUCTURAL CONTROLS

DATE: ____________________

EARTH DIKE.

FROM	TO	IS DIKE STABILIZED?	IS THERE EVIDENCE OF WASHOUT OR OVER-TOPPING?
BUILDING B	STABILIZED CONSTRUCTION ENTRANCE		
STABILIZED CONSTRUCTION ENTRANCE	SEDIMENT BASIN		
BUILDING B	SEDIMENT BASIN		

MAINTENANCE REQUIRED FOR EARTH DIKE

____

____

____

____

TO BE PERFORMED BY: ____________________________ ON OR BEFORE: ____________________________

HOMERVILLE APARTMENTS

STORM WATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT, FORM

SEDIMENT BASIN.

DEPTH OF SEDIMENT IN BASIN	CONDITION OF BASIN SIDE SLOPES	ANY EVIDENCE OF OVERTOPPING OF THE EMBANKMENT?	CONDITION OF OUTFALL FROM SEDIMENT BASIN

MAINTENANCE REQUIRED FOR SEDIMENT BASIN.

____

____

____

____

TO BE PERFORMED BY· ____________________ ON OR BEFORE: ____________________

OTHER CONTROLS

STABILIZED CONSTRUCTION ENTRANCE·

DOES MUCH SEDIMENT GET TRACKED ON TO ROAD?	IS THE GRAVEL CLEAN OR IS IT FILLED WITH SEDIMENT?	DOES ALL TRAFFIC USE THE STABILIZED ENTRANCE TO LEAVE THE SITE?	IS THE CULVERT BENEATH THE ENTRANCE WORKING?

MAINTENANCE REQUIRED FOR STABILIZED CONSTRUCTION ENTRANCE

____

____

____

____

TO BE PERFORMED BY ____________________ ON OR BEFORE· ____________________

HOMERVILLE APARTMENTS

STORM WATER POLLUTION PREVENTION PLAN

INSPECTION AND MAINTENANCE REPORT FORM

CHANGES REQUIRED TO THE POLLUTION PREVENTION PLAN:

____

____

____

____

REASONS FOR CHANGES:

____

____

____

____

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 gathered and evaluated 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.

SIGNATURE:______________________________**DATE:**______________

APPENDIX D

REFERENCES

REFERENCES

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APPENDIX E

GLOSSARY

GLOSSARY

Aeration. A process which promotes biological degradation of organic matter. The process may be passive (as when waste is exposed to air) or active (as when a mixing or bubbling device introduces the air).

Backfill: Earth used to fill a trench or an excavation

Baffles: Fin-like devices installed vertically on the inside walls of liquid waste transport vehicles that are used to reduce the movement of the waste inside the tank.

Baseline General Permit: A storm water permit (issued under the NPDES program) intended to initially cover the majority of storm water discharges associated with industrial activities. For example, EPA is planning to issue two baseline general permits: NPDES General Permits for Storm Water Discharges From Construction Activities that are classified as "Associated with Industrial Activity" and NPDES General Permits for Storm Water Discharges from Industrial Activities that are classified as "Associated with Industrial Activities." EPA is also encouraging delegated States which have an approved general permits program to issue baseline general permits.

Berm: An earthen mound used to direct the flow of runoff around or through a structure.

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 United States 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 With regard to construction these may include structural devices or nonstructural practices that are designed to prevent pollutants from entering water or to direct the flow of water.

Biodegradable: The ability to break down or decompose under natural conditions and processes

Boom: 1 A floating device used to contain oil on a body of water. 2. A piece of equipment used to apply pesticides from ground equipment such as a tractor or truck.

Buffer Strip or Zone: Strips of grass or other erosion-resistant vegetation between a waterway and an area of more intensive land use

By-product: Material, other than the principal product, that is generated as a consequence of an industrial process

Calibration: A check of the precision and accuracy of measuring equipment.

CERCLA: Comprehensive Emergency Response, Compensation, and Liability Act.

Chock: A block or wedge used to keep rolling vehicles in place.

Clay Lens: A naturally occurring, localized area of clay that acts as an impermeable layer to runoff infiltration

Commencement of Construction: The initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.

Concrete aprons: A pad of nonerosive material designed to prevent scour holes developing at the outlet ends of culverts, outlet pipes, grade stabilization structures, and other water control devices.

Conduit: Any channel or pipe for transporting the flow of water.

Conveyance: Any natural or manmade channel or pipe in which concentrated water flows.

Corrosion: The dissolving and wearing away of metal caused by a chemical reaction such as between water and the pipes that the water contacts, chemicals touching a metal surface, or contact between two metals.

Culvert: A covered channel or a large-diameter pipe that directs water flow below the ground level.

CWA: The Clean Water Act or the Federal Water Pollution Control Act.

Dedicated portable asphalt plant: A portable asphalt plant that is located on or contiguous to a construction site and that provides asphalt only to the construction site that the plant is located on or adjacent to. The term dedicated portable asphalt plant does not include facilities that are subject to the asphalt emulsion effluent limitation guideline at 40 CFR 443.

Dedicated portable concrete plant: A portable concrete plant that is located on or contiguous to a construction site and that provides concrete only to the construction site that the plant is located on or adjacent to.

Denuded: Land stripped of vegetation such as grass, or land that has had vegetation worn down due to impacts from the elements or humans.

Dike: An embankment to confine or control water, often built along the banks of a river to prevent overflow of lowlands; a levee.

Director: The Regional Administrator of the Environmental Protection Agency or an authorized representative.

Discharge: A release or flow of storm water or other substance from a conveyance or storage container.

Drip Guard: A device used to prevent drips of fuel or corrosive or reactive chemicals from contacting other materials or areas.

Emission: Pollution discharged into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities and from motor vehicle, locomotive, or aircraft exhausts.

Erosion: The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff but can be intensified by land-clearing practices related to farming, residential or industrial development, road building, or timber-cutting.

Excavation: The process of removing earth, stone, or other materials.

Fertilizer: Materials such as nitrogen and phosphorus that provide nutrients for plants. Commercially sold fertilizers may contain other chemicals or may be in the form of processed sewage sludge.

Filter Fabric: Textile of relatively small mesh or pore size that is used to (a) allow water to pass through while keeping sediment out (permeable), or (b) prevent both runoff and sediment from passing through (impermeable).

Filter Strip: Usually long, relatively narrow area of undisturbed or planted vegetation used to retard or collect sediment for the protection of watercourses, reservoirs, or adjacent properties.

Final Stabilization: The point at which all soil disturbing activities at the site have been completed, and a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

Flange: A rim extending from the end of a pipe; can be used as a connection to another pipe.

Flow Channel Liner: A covering or coating used on the inside surface of a flow channel to prevent the infiltration of water to the ground.

Flowmeter: A gauge that shows the speed of water moving through a conveyance.

Flow-weighted composite sample. A composite sample consisting of a mixture of aliquots collected at a constant time interval, where the volume of each aliquot is proportional to the flow rate of the discharge.

General Permit: A permit issued under the NPDES program to cover a certain class or category of storm water discharges These permits allow for a reduction in the administrative burden associated with permitting storm water discharges associated with industrial activities

Grading: The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Substance: 1 Any material that poses a threat to human health and/or the environment. Hazardous substances can be toxic, corrosive, ignitable, explosive, or chemically reactive 2. Any substance named required by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or if otherwise emitted into the environment

Hazardous Waste By-products of human activities that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

Holding Pond: A pond or reservoir, usually made of earth, built to store polluted runoff for a limited time.

Illicit Connection: Any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges authorized by an NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

Infiltration: 1. The penetration of water through the ground surface into sub-surface soil or the penetration of water from the soil into sewer or other pipes through defective joints, connections, or manhole walls 2 A land application technique where large volumes of wastewater are applied to land, allowed to penetrate the surface and percolate through the underlying soil

Inlet An entrance into a ditch, storm sewer, or other waterway

Intermediates: A chemical compound formed during the making of a product.

Irrigation: Human application of water to agricultural or recreational land for watering purposes.

Jute: A plant fiber used to make rope, mulch, netting, or matting

Lagoon: A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater

Land Application: Discharge of wastewater onto or into the ground for treatment or reuse

Land Treatment Units: An area of land where materials are temporarily located to receive treatment. Examples include. sludge lagoons, stabilization pond

Landfills: 1. Sanitary landfills are land disposal sites for non-hazardous solid wastes at which the waste is spread in layers, compacted to the smallest practical volume, and cover material applied at the end of each operating day 2. Secure chemical landfills are disposal sites for hazardous waste They are selected and designed to minimize the chance of release of hazardous substances into the environment

Large and Medium Municipal Separate Storm Sewer System: All municipal separate storm sewers that are either. (i) located in an incorporated place (city) with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census (these cities are listed in Appendices F and G of 40 CFR Part 122), or (ii) located in the counties with unincorporated urbanized populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties (these counties are listed in Appendices H and I of 40 CFR Part 122), or (iii) owned or operated by a municipality other than those described in paragraph (i) or (ii) and that are designated by the Director as part of the large or medium municipal separate storm sewer system

Leaching: The process by which soluble constituents are dissolved in a solvent such as water and carried down through the soil

Level Spreader: A device used to spread out storm water runoff uniformly over the ground surface as sheetflow (i.e., not through channels) The purpose of level spreaders are to prevent concentrated, erosive flows from occurring and to enhance infiltration.

Liming: Treating soil with lime to neutralize acidity levels

Liner: 1. A relatively impermeable barrier designed to prevent leachate from leaking from a landfill. Liner materials include plastic and dense clay. 2. An insert or sleeve for sewer pipes to prevent leakage or infiltration.

Liquid Level Detector: A device that provides continuous measures of liquid levels in liquid storage areas or containers to prevent overflows

Material Storage Areas Onsite locations where raw materials, products, final products, by-products, or waste materials are stored.

Mulch: A natural or artificial layer of plant residue or other materials covering the land surface which conserves moisture, holds soil in place, aids in establishing plant cover, and minimizes temperature fluctuations

Noncontact Cooling Water. Water used to cool machinery or other materials without directly contacting process chemicals or materials

Notice of Intent (NOI): An application to notify the permitting authority of a facility's intention to be covered by a general permit; exempts a facility from having to submit an individual or group application.

NPDES: EPA's program to control the discharge of pollutants to waters of the United States. See the definition of "National Pollutant Discharge Elimination System" in 40 CFR 122.2 for further guidance.

NPDES Permit: An authorization, license, or equivalent control document issued by EPA or an approved State agency to implement the requirements of the NPDES program.

Oil and Grease Traps. Devices which collect oil and grease, removing them from water flows.

Oil Sheen: A thin, glistening layer of oil on water

Oil/Water Separator. A device installed, usually at the entrance to a drain, which removes oil and grease from water flows entering the drain.

Organic Pollutants. Substances containing carbon which may cause pollution problems in receiving streams

Organic Solvents. Liquid organic compounds capable of dissolving solids, gases, or liquids.

Outfall: The point, location, or structure where wastewater or drainage discharges from a sewer pipe, ditch, or other conveyance to a receiving body of water.

Permeability: The quality of a soil that enables water or air to move through it. Usually expressed in inches/hour or inches/day

Permit. An authorization, license, or equivalent control document issued by EPA or an approved State agency to implement the requirements of an environmental regulation; e.g , a permit to operate a wastewater treatment plant or to operate a facility that may generate harmful emissions

Permit Issuing Authority (or Permitting Authority): The State agency or EPA Regional office which issues environmental permits to regulated facilities.

Plunge pool: A basin used to slow flowing water, usually constructed to a design depth and shape. The pool may be protected from erosion by various lining materials.

Pneumatic Transfer A system of hoses which uses the force of air or other gas to push material through, used to transfer solid or liquid materials from tank to tank.

Point Source: Any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, or vessel or other floating craft, from which pollutants are or may be discharged.

Pollutant: Any 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 discharged equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water. It does not mean:

(i) Sewage from vessels; or

(ii) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well used either to facilitate production or for disposal purposes is approved by the authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources (Section 502(6) of the CWA).

Radioactive materials covered by the Atomic Energy Act are those encompassed in its definition of source, byproduct, or special nuclear materials. Examples of materials not covered include radium and accelerator-produced isotopes. See Train v. Colorado Public Interest Research Group, Inc., 426 U.S. 1 (1976).

Porous Pavement: A human-made surface that will allow water to penetrate through and percolate into soil (as in porous asphalt pavement or concrete). Porous asphalt pavement is comprised of irregular shaped crush rock precoated with asphalt binder. Water seeps through into lower layers of gravel for temporary storage, then filters naturally into the soil.

Precipitation: Any form of rain or snow.

Preventative Maintenance Program: A schedule of inspections and testing at regular intervals intended to prevent equipment failures and deterioration.

Process Wastewater: Water that comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, waste product, or wastewater.

PVC (Polyvinyl Chloride): A plastic used in pipes because of its strength; does not dissolve in most organic solvents.

Raw Material: Any product or material that is converted into another material by processing or manufacturing.

RCRA: Resource Conservation and Recovery Act.

Recycle: The process of minimizing the generation of waste by recovering usable products that might otherwise become waste. Examples are the recycling of aluminum cans, wastepaper, and bottles.

Reportable Quantity (RQ): The quantity of a hazardous substance or oil that triggers reporting requirements under CERCLA or the Clean Water Act. If a substance is released in amounts exceeding its RQ, the release must be reported to the National Response Center, the State Emergency Response Commission, and community emergency coordinators for areas likely to be affected (see Appendix I for a list of RQs).

Residual: Amount of pollutant remaining in the environment after a natural or technological process has taken place, e.g., the sludge remaining after initial wastewater treatment, or particulates remaining in air after the air passes through a scrubbing or other pollutant removal process.

Retention: The holding of runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.

Retrofit: The modification of storm water management systems in developed areas through the construction of wet ponds, infiltration systems, wetland plantings, stream bank stabilization, and other BMP techniques for improving water quality. A retrofit can consist of the construction of a new BMP in the developed area, the enhancement of an older storm water management structure, or a combination of improvement and new construction

ill Erosion: The formation of numerous, closely spread streamlets due to uneven removal of surface soils by storm water or other water.

liparian Habitat: Areas adjacent to rivers and streams that have a high density, diversity, and productivity of plant and animal species relative to nearby uplands.

lunon: Storm water surface flow or other surface flow which enters property other than that where it originated.

Runoff: That part of precipitation, snow melt, or irrigation water that runs off the land into streams or other surface water It can carry pollutants from the air and land into the receiving waters

lunoff coefficient. The fraction of total rainfall that will appear at the conveyance as runoff.

Sanitary Sewer: A system of underground pipes that carries sanitary waste or process wastewater to a treatment plant.

Sanitary Waste: Domestic sewage

SARA: Superfund Amendments and Reauthorization Act.

Scour: The clearing and digging action of flowing water, especially the downward erosion caused by stream water in sweeping away mud and silt from the stream bed and outside bank of a curved channel.

Sealed Gate· A device used to control the flow of liquid materials through a valve.

Secondary Containment Structures, usually dikes or berms, surrounding tanks or other storage containers and designed to catch spilled material from the storage containers

Sediment Trap. A device for removing sediment from water flows; usually installed at outfall points.

Sedimentation: The process of depositing soil particles, clays, sands, or other sediments that were picked up by flowing water

Sediments: Soil, sand, and minerals washed from land into water, usually after rain. They pile up in reservoirs, rivers, and harbors, destroying fish-nesting areas and holes of water animals and cloud the water so that needed sunlight might not reach aquatic plants. Careless farming, mining, and building activities will expose sediment materials, allowing them to be washed off the land after rainfalls

Sheet Erosion: Erosion of thin layers of surface materials by continuous sheets of running water.

Sheetflow· Runoff which flows over the ground surface as a thin, even layer, not concentrated in a channel

Shelf Life: The time for which chemicals and other materials can be stored before becoming unusable due to age or deterioration.

Significant materials, as defined at 122.26(b)(12) include, but are not limited to:

- Raw materials; fuels; materials such as solvents, detergents and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); any chemical the facility is required to report pursuant to section 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA); fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have a potential to be released with storm water discharges.

Slag: Non-metal containing waste leftover from the smelting and refining of metals.

Slide Gate: A device used to control the flow of water through storm water conveyances.

Sloughing: The movement of unstabilized soil layers down a slope due to excess water in the soils.

Sludge: A semi-solid residue from any of a number of air or water treatment processes. Sludge can be a hazardous waste

Soil: The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of plants.

Solids Dewatering: A process for removing excess water from solids to lessen the overall weight of the wastes.

Source Control: A practice or structural measure to prevent pollutants from entering storm water runoff or other environmental media

Spent Solvent: A liquid solution that has been used and is no longer capable of dissolving solids, gases, or liquids

Spill Guard: A device used to prevent spills of liquid materials from storage containers.

Spill Prevention Control and Countermeasures Plan (SPCC): Plan consisting of structures, such as curbing, and action plans to prevent and respond to spills of hazardous substances as defined in the Clean Water Act.

Stopcock Valve: A small valve for stopping or controlling the flow of water or other liquid through a pipe.

Storm Drain: A slotted opening leading to an underground pipe or an open ditch for carrying surface runoff.

Storm Water: Runoff from a storm event, snow melt runoff, and surface runoff and drainage.

Storm Water Discharge Associated with Industrial Activity: The discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under 40 CFR Part 122. For the categories of industries identified in subparagraphs (i) through (x) of this subsection, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites, sites used for the application or disposal of process waste waters (as defined at 40 CFR 401); sites used for the storage and maintenance of material handling equipment, sites used for residual treatment, storage, or disposal, shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and finished products, and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water. For the categories of industries identified in subparagraph (xi), the term includes only storm water discharges from all the areas (except access roads and rail lines) that are listed in the previous sentence where material handling equipment or activities, raw materials, intermediate products, final products, waste material, by-products, or industrial machinery are exposed to storm water For the purposes of this paragraph, material handling activities include the. storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, finished product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities (including industrial facilities that are Federally, State, or municipally owned or operated that meet the description of the facilities listed in this paragraph (i)-(xi) include those facilities designated under the provision of 122.26(a)(1)(v). The following categories of facilities are considered to be engaging in "industrial activity" for purposes of this subsection:

(i) Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR Subchapter N (except facilities with toxic pollutant effluent standards which are excepted under category (xi) of this paragraph),

(ii) Facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283 and 285) 29, 311, 32 (except 323), 33, 3441, 372;

(iii) Facilities classified as Standard Industrial Classifications 10 though 14 (mineral industry) including active or inactive mining operations (except for areas of coal mining operations no longer meeting the definition of a reclamation area under 40 CFR 434.11(l) because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or except for areas of non-coal mining operations which have been released from applicable State or Federal reclamation requirements after December 17, 1990 and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations, (inactive mining operations are mining sites that are not being actively mined, but which have an identifiable owner/operator, inactive mining sites do not include sites where mining claims are being maintained prior to disturbances associated with the extraction, beneficiation, or processing of mined materials, nor sites where minimal activities are undertaken for the sole purpose of maintaining mining claim);

(iv) Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of RCRA;

(v) Landfills, land application sites, and open dumps that receive or have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under Subtitle D of RCRA;

(vi) Facilities involved in the recycling of materials, including metal scrapyards, battery reclaimers, salvage yards, and automobiles junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093;

(vii) Steam electric power generating facilities, including coal handling sites,

(viii) Transportation facilities classified as Standard Industrial Classifications 40, 41, 42 (except 4221-25), 43, 44, 45, and 5171 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or which

are otherwise identified under paragraphs (i)-(vii) or (ix)-(xi) of this subsection are associated with industrial activity;
(ix) Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR 403. Not included are farm lands, domestic gardens or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with Section 405 of the CWA;
(x) Construction activity including clearing, grading and excavation activities except: operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale,
(xi) Facilities under Standard Industrial Classification 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-25, (and which are not otherwise included within categories (ii)-(x));

Note: The Transportation Act of 1991 provides an exemption from storm water permitting requirements for certain facilities owned or operated by municipalities with a population of less than 100,000. Such municipalities must submit storm water discharge permit applications for only airports, power plants, and uncontrolled sanitary landfills that they own or operate, unless a permit is otherwise required by the permitting authority.

Subsoil: The bed or stratum of earth lying below the surface soil.

Sump: A pit or tank that catches liquid runoff for drainage or disposal

Surface Impoundment: Treatment, storage, or disposal of liquid wastes in ponds.

Surface Water: All water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, wetlands impoundments, seas, estuaries, etc.); also refers to springs, wells, or other collectors which are directly influenced by surface water.

Swale: An elongated depression in the land surface that is at least seasonally wet, is usually heavily vegetated, and is normally without flowing water. Swales direct storm water flows into primary drainage channels and allow some of the storm water to infiltrate into the ground surface.

Tarp: A sheet of waterproof canvas or other material used to cover and protect materials, equipment, or vehicles.

Topography: The physical features of a surface area including relative elevations and the position of natural and human-made features.

Toxic Pollutants: Any pollutant listed as toxic under Section 501(a)(1) or, in the case of "sludge use or disposal practices," any pollutant identified in regulations implementing Section 405(d) of the CWA. Please refer to 40 CFR Part 122 Appendix D.

Treatment: The act of applying a procedure or chemicals to a substance to remove undesirable pollutants.

Tributary: A river or stream that flows into a larger river or stream

Underground Storage Tanks (USTs): Storage tanks with at least 10-percent or more of its storage capacity underground (the complete regulatory definition is at 40 CFR Part 280 12).

Waste: Unwanted materials left over from a manufacturing or other process

Water Table: The depth or level below which the ground is saturated with water.

Waters of the United States:
"(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
(b) All interstate waters, including interstate "wetlands;"
(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:
(1) Which are or could be used by interstate or foreign travelers for recreational or other purposes,
(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce, or
(3) Which are used or could be used for industrial purposes by industries in interstate commerce;
(d) All impoundments of waters otherwise defined as waters of the United States under this definition,
(e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;
(f) The territorial sea, and
(g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.
Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423 11(m) which also meet the criteria of this definition) are not waters of the United States This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States

Waterway: A channel for the passage or flow of water.

Wet Well: A chamber used to collect water or other liquid and to which a pump is attached

Wetlands: An area that is regularly saturated by surface or ground water and subsequently is characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions. Examples include swamps, bogs, fens, marshes, and estuaries

Wind Break: Any device designed to block wind flow and intended for protection against any ill effects of wind.

APPENDIX F

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES
40 CFR 302 4 and 117

Note All comments are located at the end of this table

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Acenaphthene	83329		1*	2		B	100 (45 4)
Acenaphthylene	208968		1*	2		D	5000 (2270)
Acetaldehyde	75070	Ethanal	1000	1,4	U001	C	1000 (454)
Acetaldehyde, chloro-	107200	Chloroacetaldehyde	1*	4	P023	C	1000 (454)
Acetaldehyde, trichloro-	75876	Chloral	1*	4	U034	D	5000 (2270)
Acetamide, N- aminothioxomethyl)-	591082	1-Acetyl-2-thiourea	1*	4	P002	C	1000 (454)
Acetamide, N-(4-ethoxyphenyl)-	62442	Phenacetin	1*	4	U187	B	100 (45 4)
Acetamide, 2-fluoro-	640197	Fluoroacetamide	1*	4	P057	B	100 (45 4)
Acetamide, N-9H-fluoren-2-yl-	53963	2-Acetylaminofluorene	1*	4	U005	X	1 (0 454)
Acetic acid	64197		1000	1		D	5000 (2270)
Acetic acid (2,4-dichlorophenoxy)-	94757	2,4-D Acid 2,4-D, salts and esters	100	1,4	U240	B	100 (45 4)
Acetic Acid, lead(2+) salt	301042	Lead acetate	5000	1,4	U144		#
Acetic acid, thallium(1+) salt	563688	Thallium(I) acetate	1*	4	U214	B	100 (45 4)
Acetic acid (2,4,5- richlorophenoxy)-	93765	2,4,5-T 2,4,5-T acid	100	1,4	U232	C	1000 (454)
Acetic acid, ethyl ester	141786	Ethyl acetate	1*	4	U112	D	5000 (2270)
Acetic acid, fluoro-, sodium salt	62748	Fluoroacetic acid, sodium salt	1*	4	P058	A	10 (4 54)
Acetic anhydride	108247		1000	1		D	5000 (2270)
Acetone	67641	2-Propanone	1*	4	U002	D	5000 (2270)
Acetone cyanohydrin	75865	Propanenitrile, 2-hydroxy-2-methyl-2-Methyllactonitrile	10	1,4	P069	A	10 (4 54)
Acetonitrile	75058		1*	4	U003	D	5000 (2270)
Acetophenone	98862	Ethanone, 1-phenyl-	1*	4	U004	D	5000 (2270)
2-Acetylaminofluorene	53963	Acetamide, N-9H-fluoren-2-yl-	1*	4	U005	X	1 (0 454)
Acetyl bromide	506967		5000	1		D	5000 (2270)
Acetyl chloride	75365		5000	1,4	U006	D	5000 (2270)
1-Acetyl-2-thiourea	591082	Acetamide, N-(aminothioxomethyl)-	1*	4	P002	C	1000 (454)
Acrolein	107028	2-Propenal	1	1,2,4	P003	X	1 (0 454)
Acrylamide	79061	2-Propenamide	1*	4	U007	D	5000 (2270)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Acrylic acid	79107	2-Propenoic acid	1*	4	U008	D	5000 (2270)
Acrylonitrile	107131	2-Propenenitrile	100	1,2,4	U009	B	100 (45 4)
Adipic acid	124049		5000	1		D	5000 (2270)
Aldicarb	116063	Propanal, 2-methyl-2-(methylthio)-,O-[(methylamino) carbonyl]oxime	1*	4	P070	X	1 (0 454)
Aldrin	309002	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha, 8alpha,8abeta)-	1	1,2,4	P004	X	1 (0 454)
Allyl alcohol	107186	2-Propen-1-ol	100	1,4	P005	B	100 (45 4)
Allyl chloride	107051		1000	1		C	1000 (454)
Aluminum phosphide	20859738		1*	4	P006	B	100 (45 4)
Aluminum sulfate	10043013		5000	1		D	5000 (2270)
5 (Aminomethyl)-3-isoxazolol	2763964	Muscimol 3(2H)-Isoxazolone, 5-(aminomethyl)-	1*	4	P007	C	1000 (454)
4-Aminopyridine	504245	4-Pyridinamine	1*	4	P008	C	1000 (454)
Amitrole	61825	1H-1,2,4-Triazol-3-amine	1*	4	U011	A	10 (4.54)
Ammonia	7664417		100	1		B	100 (45 4)
Ammonium acetate	631618		5000	1		D	5000 (2270)
Ammonium benzoate	1863634		5000	1		D	5000 (2270)
Ammonium bicarbonate	1066337		5000	1		D	5000 (2270)
Ammonium bichromate	7789095		1000	1		A	10 (4 54)
Ammonium bifluoride	1341497		5000	1		B	100 (45 4)
Ammonium bisulfite	10192300		5000	1		D	5000 (2270)
Ammonium carbamate	1111780		5000	1		D	5000 (2270)
Ammonium carbonate	506876		5000	1		D	5000 (2270)
Ammonium chloride	12125029		5000	1		D	5000 (2270)
Ammonium chromate	7788989		1000	1		A	10 (4 54)
Ammonium citrate, dibasic	3012655		5000	1		D	5000 (2270)
Ammonium fluoborate	13826830		5000	1		D	5000 (2270)
Ammonium fluoride	12125018		5000	1		B	100 (45 4)
Ammonium hydroxide	1336216		1000	1		C	1000 (454)
Ammonium oxalate	6009707		5000	1		D	5000 (2270)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
	5972736		5000	1		D	5000 (2270)
	14258492		5000	1		D	5000 (2270)
nmonium picrate	131748	Phenol, 2,4,6-trinitro-, ammonium salt	1*	4	P009	A	10 (4.54)
nmonium silicofluoride	16919190		1000	1		C	1000 (454)
nmonium sulfamate	7773060		5000	1		D	5000 (2270)
nmonium sulfide	12135761		5000	1		B	100 (45.4)
nmonium sulfite	10196040		5000	1		D	5000 (2270)
nmonium tartrate	14307438		5000	1		D	5000 (2270)
	3164292		5000	1		D	5000 (2270)
mmonium thiocyanate	1762954		5000	1		D	5000 (2270)
mmonium vanadate	7803556	Vanadic acid, ammonium salt	1*	4	P119	C	1000 (454)
myl acetate	628637		1000	1		D	5000 (2270)
so-Amyl acetate	123922		1000	1		D	5000 (2270)
sec-Amyl acetate	626380		1000	1		D	5000 (2270)
ert-Amyl acetate	625161		1000	1		D	5000 (2270)
niline	62533	Benzenamine	1000	1,4	U012	D	5000 (2270)
nthracene	120127		1*	2		D	5000 (2270)
ntimony††	7440360		1*	2		D	5000 (2270)
NTIMONY AND COMPOUNDS	N/A		1*	2			**
ntimony pentachloride	7647189		1000	1		C	1000 (454)
ntimony potassium tartrate	28300745		1000	1		B	100 (45 4)
ntimony tribromide	7789619		1000	1		C	1000 (454)
ntimony trichloride	10025919		1000	1		C	1000 (454)
ntimony trifluoride	7783564		1000	1		C	1000 (454)
ntimony trioxide	1309644		5000	1		C	1000 (454)
rgentate(1-), bis(cyano-C)-, otassium	506616	Potassium silver cyanide	1*	4	P099	X	1 (0.454)
roclor 1016	12674112	POLYCHLORINATED BIPHENYLS (PCBs)	10	1,2		X	1 (0.454)
roclor 1221	11104282	POLYCHLORINATED BIPHENYLS (PCBs)	10	1,2		X	1 (0 454)
roclor 1232	11141165	POLYCHLORINATED BIPHENYLS (PCBs)	10	1,2		X	1 (0 454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
Aroclor 1242	53469219	POLYCHLORINATED BIPHENYLS (PCBs)	10	1,2		X	1 (0 454)
Aroclor 1248	12672296	POLYCHLORINATED BIPHENYLS (PCBs)	10	1,2		X	1 (0 454)
Aroclor 1254	11097691	POLYCHLORINATED BIPHENYLS (PCBs)	10	1,2		X	1 (0 454)
Aroclor 1260	11096825	POLYCHLORINATED BIPHENYLS (PCBs)	10	1,2		X	1 (0 454)
Arsenic††	7440382		1*	2,3		X	1 (0 454)
Arsenic acid	1327522	Arsenic acid H3AsO4	1*	4	P010	X	1 (0 454)
	7778394						
Arsenic acid H3AsO4	1327522	Arsenic acid	1*	4	P010	X	1 (0 454)
	7778394		1*	4	P010	X	1(0 454)
ARSENIC AND COMPOUNDS	N/A		1*	2			**
Arsenic disulfide	1303328		5000	1		X	1 (0 454)
Arsenic oxide As2O3	1327533	Arsenic trioxide	5000	1,4	P012	X	1 (0 454)
Arsenic oxide As2O5	1303282	Arsenic pentoxide	5000	1,4	P011	X	1 (0 454)
Arsenic pentoxide	1303282	Arsenic oxide As2O5	5000	1,4	P011	X	1 (0 454)
Arsenic trichloride	7784341		5000	1		X	1 (0 454)
Arsenic trioxide	1327533	Arsenic oxide As2O3	5000	1,4	P012	X	1 (0 454)
Arsenic trisulfide	1303339		5000	1		X	1 (0 454)
Arsine, diethyl-	692422	Diethylarsine	1*	4	P038	X	1 (0 454)
Arsinic acid, dimethyl-	75605	Cacodylic acid	1*	4	U136	X	1 (0.454)
Arsonous dichloride, phenyl-	696286	Dichlorophenylarsine	1*	4	P036	X	1 (0 454)
Asbestos†††	1332214		1*	2,3		X	1 (0 454)
Auramine	492808	Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-	1*	4	U014	B	100 (45 4)
Azaserine	115026	L-Serine, diazoacetate (ester)	1*	4	U015	X	1 (0 454)
Aziridine	151564	Ethylenimine	1*	4	P054	X	1 (0 454)
Aziridine, 2-methyl-	75558	1,2-Propylenimine	1*	4	P067	X	1 (0 454)
Azirino[2',3':3,4]pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1aS-(1aalpha,8beta,8aalpha,8balpha)]-	50077	Mitomycin C	1*	4	U010	A	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
um cyanide	542621		10	1,4	P013	A	10 (4 54)
ız[j]aceanthrylene, 1,2-dihydro- ıethyl-	56495	3-Methylcholanthrene	1*	4	U157	A	10 (4 54)
ız(c)acridine	225514		1*	4	U016	B	100 (45 4)
ızal chloride	98873	Benzene, dichloromethyl-	1*	4	U017	D	5000 (2270)
ızamide, 3,5-dichloro-N-(1,1- ıethyl-2-propynyl)-	23950585	Pronamide	1*	4	U192	D	5000 (2270)
ız[a]anthracene	56553	Benzo[a]anthracene 1,2-Benzanthracene	1*	2,4	U018	A	10 (4.54)
-Benzanthracene	56553	Benz[a]anthracene Benzo[a]anthracene	1*	2,4	U018	A	10 (4 54)
ız[a]anthracene, 7,12-dimethyl	57976	7,12-Dimethylbenz[a]anthracene	1*	4	U094	X	1 (0 454)
nzenamine	62533	Aniline	1000	1,4	U012	D	5000 (2270)
nzenamine, 4,4'- bonimidoylbis (N,N-dimethyl-	492808	Auramine	1*	4	U014	B	100 (45 4)
nzenamine, 4-chloro-	106478	p-Chloroaniline	1*	4	P024	C	1000 (454)
nzenamine, 4-chloro-2-methyl-, drochloride	3165933	4-Chloro-o-toluidine, hydrochloride	1*	4	U049	B	100 (45 4)
nzenamine, N,N-dimethyl- ›henylazo-)	60117	p-Dimethylaminoazobenzene	1*	4	U093	A	10 (4 54)
nzenamine, 2-methyl-	95534	o-Toluidine	1*	4	U328	B	100 (45 4)
nzenamine, 4-methyl-	106490	p-Toluidine	1*	4	U353	B	100 (45 4)
nzenamine, 4,4'-methylenebis(2- loro-	101144	4,4'-Methylenebis(2-chloroaniline)	1*	4	U158	A	10 (4 54)
nzenamine, 2-methyl-, drochloride	636215	o-Toluidine hydrochloride	1*	4	U222	B	100 (45 4)
ınzenamine, 2-methyl-5-nitro	99558	5-Nitro-o-toluidine	1*	4	U181	B	100 (45 4)
ınzenamine, 4-nitro-	100016	p-Nitroaniline	1*	4	P077	D	5000 (2270)
ınzene	71432		1000	1,2, 3,4	U109	A	10 (4 54)
ınzeneacetic acid, 4-chloro- ›ha-(4-chlorophenyl)-alpha- /droxy-, ethyl ester	510156	Chlorobenzilate	1*	4	U038	A	10 (4.54)
ənzene, 1-bromo-4-phenoxy-	101553	4-Bromophenyl phenyl ether	1*	2,4	U030	B	100 (45 4)
ənzenebutanoic acid, [bis(2-chloroethyl)amino]-	305033	Chlorambucil	1*	4	U035	A	10 (4 54)
enzene, chloro-	108907	Chlorobenzene	100	1,2,4	U037	B	100 (45 4)
enzene, chloromethyl-	100447	Benzyl chloride	100	1,4	P028	B	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
Benzenediamin, ar-methyl-	95807	Toluenediamine	1*	4	U221	A	10 (4 54
	496720		1*	4	U221	A	10 (4 54
	823405		1*	4	U221	A	10 (4 54
1,2-Benzenedicarboxylic acid, dioctyl ester	117840	Di-n-octyl phthalate	1*	2,4	U107	D	5000 (2270
1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)]-ester	117817	Bis (2-ethylhexyl)phthalate Diethylhexyl phthalate	1*	2,4	U028	B	100 (45 4)
1,2-Benzenedicarboxylic acid, dibutyl ester	84742	Di-n-butyl phthalate Dibutyl phthalate n-Butyl phthalate	100	1,2,4	U069	A	10 (4 54)
1,2-Benzenedicarboxylic acid, diethyl ester	84662	Diethyl phthalate	1*	2,4	U088	C	1000 (454)
1,2-Benzenedicarboxylic acid, dimethyl ester	131113	Dimethyl phthalate	1*	2,4	U102	D	5000 (2270)
Benzene, 1,2-dichloro-	95501	o-Dichlorobenzene 1,2-Dichlorobenzene	100	1,2,4	U070	B	100 (45 4)
Benzene, 1,3-dichloro-	541731	m-Dichlorobenzene 1,3-Dichlorobenzene	1*	2,4	U071	B	100 (45 4)
Benzene, 1,4-dichloro-	106467	p-Dichlorobenzene 1,4-Dichlorobenzene	100	1,2,4	U072	B	100 (45 4)
Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-	72548	DDD TDE 4,4' DDD	1	1,2,4	U060	X	1 (0.454)
Benzene, dichloromethyl-	98873	Benzal chloride	1*	4	U017	D	5000 (2270)
Benzene, 1,3-diisocyanatomethyl-	584849	Toluene diisocyanate	1*	4	U223	B	100 (45 4)
	91087		1*	4	U223	B	100 (45 4)
	26471625		1*	4	U223	B	100 (45 4)
Benzene, dimethyl	1330207	Xylene (mixed)	1000	1,4	U239	C	1000 (454)
m Benzene, dimethyl	108383	m-Xylene	1000	1,4	U239	C	1000 (454)
o-Benzene, dimethyl	95476	o-Xylene	1000	1,4	U239	C	1000 (454)
p Benzene, dimethyl	106423	p-Xylene	1000	1,4	U239	C	1000 (454)
1,3-Benzenediol	108463	Resorcinol	1000	1,4	U201	D	5000 (2270)
1,2-Benzenediol,4-[1-hydroxy-2-(methylamino)ethyl]-	51434	Epinephrine	1*	4	P042	C	1000 (454)
Benzeneethanamine, alpha,alpha-dimethyl-	122098	alpha,alpha-Dimethylphenethylamine	1*	4	P046	D	5000 (2270)
Benzene, hexachloro-	118741	Hexachlorobenzene	1*	2,4	U127	A	10 (4 54)
Benzene, hexahydro-	110827	Cyclohexane	1000	1,4	U056	C	1000 (454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
ızene, hydroxy-	108952	Phenol	1000	1,2,4	U188	C	1000 (454)
ızene, methyl-	108883	Toluene	1000	1,2,4	U220	C	1000 (454)
ızene, 2-methyl-1,3-dinitro-	606202	2,6-Dinitrotoluene	1000	1,2,4	U106	B	100 (45 4)
ızene, 1-methyl-2,4-dinitro-	121142	2,4-Dinitrotoluene	1000	1,2,4	U105	A	10 (4 54)
ızene, 1-methylethyl-	98828	Cumene	1*	4	U055	D	5000 (2270)
ızene, nitro-	98953	Nitrobenzene	1000	1,2,4	U169	C	1000 (454)
ızene, pentachloro-	608935	Pentachlorobenzene	1*	4	U183	A	10 (4 54)
ızene, pentachloronitro-	82688	Pentachloronitrobenzene (PCNB)	1*	4	U185	B	100 (45 4)
ızenesulfonic acid chloride	98099	Benzenesulfonyl chloride	1*	4	U020	B	100 (45.4)
ızenesulfonyl chloride	98099	Benzenesulfonic acid chloride	1*	4	U020	B	100 (45.4)
ızene, 1,2,4,5-tetrachloro-	95943	1,2,4,5-Tetrachlorobenzene	1*	4	U207	D	5000 (2270)
ızenethiol	108985	Thiophenol	1*	4	P014	B	100 (45 4)
ızene, 1,1'-(2,2,2-tri- oroethylidene)bis[4-chloro-	50293	DDT 4,4'DDT	1	1,2,4	U061	X	1 (0 454)
ızene, 1,1'-(trichloroethylidene) 4-methoxy-	72435	Methoxychlor	1	1,4	U247	X	1 (0 454)
ızene, (trichloromethyl)-	98077	Benzotrichloride	1*	4	U023	A	10 (4 54)
ızene, 1,3,5-trinitro-	99354	1,3,5-Trinitrobenzene	1*	4	U234	A	10 (4 554)
ızidine	92875	(1,1' Biphenyl)-4,4'diamine	1*	2,4	U021	X	1 (0 454)
-Benzisothiazol-3(2H)-one, 1,1- xide	81072	Saccharin and salts	1*	4	U202	B	100 (45 4)
nzo[a]anthracene	56553	Benz[a]anthracene 1,2-Benzanthracene	1*	2,4	U018	A	10 (4 54)
nzo[b]fluoranthene	205992		1*	2		X	1 (0 454)
nzo(k)fluoranthene	207089		1*	2		D	5000 (2270)
nzo[j,k]fluorene	206440	Fluoranthene	1*	2,4	U120	B	100 (45 4)
-Benzodioxole, 5-(1-propenyl)-	120581	Isosafrole	1*	4	U141	B	100 (45 4)
-Benzodioxole, 5-(2-propenyl)-	94597	Safrole	1*	4	U203	B	100 (45 4)
-Benzodioxole, 5-propyl-	94586	Dihydrosafrole	1*	4	U090	A	10 (4 54)
nzoic acid	65850		5000	1		D	5000 (2270)
nzonitrile	100470		1000	1		D	5000 (2270)
nzo[rst]pentaphene	189559	Dibenz[a,i]pyrene	1*	4	U064	A	10 (4 54)
nzo[ghi]perylene	191242		1*	2		D	5000 (2270)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
2H-1 Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl butyl)-, & salts, when present at concentrations greater than 0 3%	81812	Warfarin, & salts, when present at concentrations greater than 0 3%	1*	4	P001	B	100 (45 4)
Benzo[a]pyrene	50328	3,4-Benzopyrene	1*	2,4	U022	X	1 (0 454)
3,4-Benzopyrene	50328	Benzo[a]pyrene	1*	2,4	U022	X	1 (0 454)
p-Benzoquinone	106514	2,5-Cyclohexadiene-1,4-dione	1*	4	U197	A	10 (4 54)
Benzotrichloride	98077	Benzene, (trichloromethyl)-	1*	4	U023	A	10 (4 54)
Benzoyl chloride	98884		1000	1		C	1000 (454)
1,2-Benzphenanthrene	218019	Chrysene	1*	2,4	U050	B	100 (45 4)
Benzyl chloride	100447	Benzene, chloromethyl-	100	1,4	P028	B	100 (45 4)
Beryllium††	7440417	Beryllium dust ††	1*	2,3,4	P015	A	10 (4 54)
BERYLLIUM AND COMPOUNDS	N/A		1*	2			**
Beryllium chloride	7787475		5000	1		X	1 (0 454)
Beryllium dust††	7440417	Beryllium††	1*	2,3,4	P015	A	10 (4 54)
Beryllium fluoride	7787497		5000	1		X	1 (0 454)
Beryllium nitrate	13597994		5000	1		X	1 (0 454)
	7787555		5000	1		X	1 (0 454)
alpha BHC	319846		1*	2		A	10 (4 54)
beta BHC	319857		1*	2		X	1 (0 454)
delta-BHC	319868		1*	2		X	1 (0 454)
gamma BHC	58899	Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1alpha,2alpha,3beta, 4alpha,5alpha,6 beta)- Hexachlorocyclohexane (gamma isomer) Lindane	1	1,2,4	U129	X	1 (0 454)
2,2'-Bioxirane	1464535	1,2 3,4-Diepoxybutane	1*	4	U085	A	10 (4 54)
(1,1'-Biphenyl)-4,4'diamine	92875	Benzidine	1*	2,4	U021	X	1 (0 454)
[1,1'-Biphenyl]-4,4'diamine,3,3'dichloro-	91941	3,3'-Dichlorobenzidine	1*	2,4	U073	X	1 (0 454)
[1,1'-Biphenyl]-4,4'diamine,3,3'dimethoxy-	119904	3,3'-Dimethoxybenzidine	1*	4	U091	B	100 (45 4)
[1,1'-Biphenyl]-4,4'-diamine,3,3'-dimethyl-	119937	3,3'-Dimethylbenzidine	1*	4	U095	A	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
2-chloroethyl) ether	111444	Dichloroethyl ether Ethane, 1,1'-oxybis[2-chloro-	1*	2,4	U025	A	10 (4 54)
-chloroethoxy) methane	111911	Dichloromethoxy ethane Ethane, 1,1'-[methylenebis(oxy)] bis(2-chloro-	1*	2,4	U024	C	1000 (454)
2-ethylhexyl)phthalate	117817	Diethylhexyl phthalate 1,2-Benzenedicarboxylic acid, [bis(2 ethylhexyl)] ester	1*	2,4	U028	B	100 (45 4)
noacetone	598312	2-Propanone, 1-bromo-	1*	4	P017	C	1000 (454)
noform	75252	Methane, tribromo	1*	2,4	U225	B	100 (45 4)
romophenyl phenyl ether	101553	Benzene, 1-bromo-4-phenoxy-	1*	2,4	U030	B	100 (45.4)
cine	357573	Strychnidin-10-one, 2,3-dimethoxy-	1*	4	P018	B	100 (45.4)
-Butadiene, 1,1,2,3,4,4-achloro-	87683	Hexachlorobutadiene	1*	2,4	U128	X	1 (0 454)
utanamine, N-butyl-N-nitroso-	924163	N-Nitrosodi-n-butylamine	1*	4	U172	A	10 (4 54)
utanol	71363	n-Butyl alcohol	1*	4	U031	D	5000 (2270)
utanone	78933	Methyl ethyl ketone (MEK)	1*	4	U159	D	5000 (2270)
utanone peroxide	1338234	Methyl ethyl ketone peroxide	1*	4	U160	A	10 (4 54)
utanone, 3,3-dimethyl-1-ethylthio)-, O[(methylamino) bonyl] oxime	39196184	Thiofanox	1*	4	P045	B	100 (45 4)
utenal	123739	Crotonaldehyde	100	1,4	U053	B	100 (45 4)
	4170303						
utene, 1,4-dichloro-	764410	1,4-Dichloro-2-butene	1*	4	U074	X	1 (0 454)
utenoic acid, 2-methyl, 7[[2,3-iydroxy-2-(1-methoxyethyl)-3-ethyl-1-oxobutoxy]methyl]-,5,7a-tetrahydro-1H-pyrrolizin-ylester, [1S-[1alpha(Z), 2S*,3R*),7aalpha]]-	303344	Lasiocarpine	1*	4	U143	A	10 (4.54)
ityl acetate	123864		5000	1		D	5000 (2270)
so-Butyl acetate	110190		5000	1		D	5000 (2270)
sec-Butyl acetate	105464		5000	1		D	5000 (2270)
ert-Butyl acetate	540885		5000	1		D	5000 (2270)
Butyl alcohol	71363	1-Butanol	1*	4	U031	D	5000 (2270)
ıtylamine	109739		1000	1		C	1000 (454)
so-Butylamine	78819		1000	1		C	1000 (454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
sec-Butylamine	513495		1000	1		C	1000 (454)
	13952846		1000	1		C	1000 (454)
tert-Butylamine	75649		1000	1		C	1000 (454)
Butyl benzyl phthalate	85687		1*	2		B	100 (45 4)
n-Butyl phthalate	84742	Di-n-butyl phthalate Dibutyl phthalate 1,2-Benzenedicarboxylic acid, dibutyl ester	100	1,2,4	U069	A	10 (4 54)
Butyric acid	107926		5000	1		D	5000 (2270)
iso-Butyric acid	79312						
Cacodylic acid	75605	Arsinic acid, dimethyl-	1*	4	U136	X	1 (0 454)
Cadmium††	7440439		1*	2		A	10 (4 54)
Cadmium acetate	543908		100	1		A	10 (4 54)
CADMIUM AND COMPOUNDS	N/A		1*	2			**
Cadmium bromide	7789426		100	1		A	10 (4 54)
Cadmium chloride	10108642		100	1		A	10 (4 54)
Calcium arsenate	7778441		1000	1		X	1 (0.454)
Calcium arsenite	52740166		1000	1		X	1 (0.454)
Calcium carbide	75207		5000	1		A	10 (4 54)
Calcium chromate	13765190	Chromic acid H2CrO4, calcium salt	1000	1,4	U032	A	10 (4 54)
Calcium cyanide	592018	Calcium cyanide Ca(CN)2	10	1,4	P021	A	10 (4 54)
Calcium cyanide Ca(CN)2	592018	Calcium cyanide	10	1,4	P021	A	10 (4 54)
Calcium dodecylbenzenesulfonate	26264062		1000	1		C	1000 (454)
Calcium hypochlorite	7778543		100	1		A	10 (4.54)
Camphene, octachloro-	8001352	Toxaphene	1	1,2,4	P123	X	1 (0.454)
Captan	133062		10	1		A	10 (4 54)
Carbamic acid, ethyl ester	51796	Ethyl carbamate (urethane)	1*	4	U238	B	100 (45 4)
Carbamic acid, methylnitroso-, ethyl ester	615532	N-Nitroso-N-methylurethane	1*	4	U178	X	1 (0 454)
Carbamic chloride, dimethyl-	79447	Dimethylcarbamoyl chloride	1*	4	U097	X	1 (0.454)
Carbamodithioic acid, 1,2-ethanediylbis, salts & esters	111546	Ethylenebisdithiocarbamic acid, salts & esters	1*	4	U114	D	5000 (2270)
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dich-loro-2-propenyl) ester	2303164	Diallate	1*	4	U062	B	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
arbaryl	63252		100	1		B	100 (45 4)
arbofuran	1563662		10	1		A	10 (4 54)
arbon disulfide	75150		5000	1,4	P022	B	100 (45 4)
arbon oxyfluoride	353504	Carbonic difluoride	1*	4	U033	C	1000 (454)
arbon tetrachloride	56235	Methane, tetrachloro-	5000	1,2,4	U211	A	10 (4 54)
arbonic acid, dithallium(1+) salt	653739	Thallium(I) carbonate	1*	4	U215	B	100 (45.4)
arbonic dichloride	75445	Phosgene	5000	1,4	P095	A	10 (4.54)
arbonic difluoride	353504	Carbon oxyfluoride	1*	4	U033	C	1000 (454)
arbonochloridic acid, methyl ester	79221	Methyl chlorocarbonate Methyl chloroformate	1*	4	U156	C	1000 (454)
hloral	75876	Acetaldehyde, trichloro-	1*	4	U034	D	5000 (2270)
hlorambucil	305033	Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	1*	4	U035	A	10 (4 54)
'hlordane	57749	Chlordane, alpha & gamma isomers Chlordane, technical 4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	1	1,2,4	U036	X	1 (0 454)
.HLORDANE (TECHNICAL /IIXTURE AND METABOLITES)	N/A		1*	2			**
:hlordane, alpha & gamma somers	57749	Chlordane Chlordane, technical 4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	1	1,2,4	U036	X	1 (0 454)
:hlordane, technical	57749	Chlordane Chlordane, alpha & gamma isomers 4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahyrdo-	1	1,2,4	U036	X	1 (0 454)
CHLORINATED BENZENES	N/A		1*	2			**
CHLORINATED ETHANES	N/A		1*	2			**
CHLORINATED NAPHTHALENE	N/A		1*	2			**
CHLORINATED PHENOLS	N/A		1*	2			**
Chlorine	7782505		10	1		A	10 (4 54)
Chlornaphazine	494031	Naphthalenamine, N,N'-bis(2-chloroethyl)-	1*	4	U026	B	100 (45.4)
Chloroacetaldehyde	107200	Acetaldehyde, chloro-	1*	4	P023	C	1000 (454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
CHLOROALKYL ETHERS	N/A		1*	2			**
p Chloroaniline	106478	Benzenamine, 4-chloro-	1*	4	P024	C	1000 (454)
Chlorobenzene	108907	Benzene, chloro-	100	1,2,4	U037	B	100 (45 4)
Chlorobenzilate	510156	Benzeneacetic acid, 4-chloro-alpha-(4-chloro-phenyl)-alpha-hydroxy-, ethyl ester	1*	4	U038	A	10 (4 54)
4-Chloro-m-cresol	59507	p-Chloro-m-cresol Phenol, 4-chloro-3-methyl	1*	2,4	U039	D	5000 (2270)
p-Chloro m cresol	59507	Phenol, 4-chloro-3-methyl- 4-Chloro-m-cresol	1*	2,4	U039	D	5000 (2270)
Chlorodibromomethane	124481		1*	2		B	100 (45 4)
Chloroethane	75003		1*	2		B	100 (45 4)
2-Chloroethyl vinyl ether	110758	Ethane, 2-chloroethoxy-	1*	2,4	U042	C	1000 (454)
Chloroform	67663	Methane, trichloro-	5000	1,2,4	U044	A	10 (4 54)
Chloromethyl methyl ether	107302	Methane, chloromethoxy-	1*	4	U046	A	10 (4 54)
beta Chloronaphthalene	91587	Naphthalene, 2-chloro- 2-Chloronaphthalene	1*	2,4	U047	D	5000 (2270)
2-Chloronaphthalene	91587	beta-Chloronaphthalene Naphthalene, 2-chloro-	1*	2,4	U047	D	5000 (2270)
2-Chlorophenol	95578	o-Chlorophenol Phenol, 2-chloro-	1*	2,4	U048	B	100 (45 4)
o-Chlorophenol	95578	Phenol, 2-chloro- 2-Chlorophenol	1*	2,4	U048	B	100 (45 4)
4-Chlorophenyl phenyl ether	7005723		1*	2		D	5000 (2270)
1-(o-Chlorophenyl)thiourea	5344821	Thiourea, (2-chlorophenyl)-	1*	4	P026	B	100 (45 4)
3-Chloropropionitrile	542767	Propanenitrile, 3-chloro-	1*	4	P027	C	1000 (454)
Chlorosulfonic acid	7790945		1000	1		C	1000 (454)
4-Chloro-o-toluidine, hydrochloride	3165933	Benzenamine, 4-chloro-2-methyl-, hydrochloride	1*	4	U049	B	100 (45 4)
Chlorpyrifos	2921882		1	1		X	1 (0 454)
Chromic acetate	1066304		1000	1		C	1000 (454)
Chromic acid	11115745		1000	1		A	10 (4 54)
	7738945		1000	1		A	10 (4 54)
Chromic acid H2CrO4, calcium salt	13765190	Calcium chromate	1000	1,4	U032	A	10 (4 54)
Chromic sulfate	10101538		1000	1		C	1000 (454)
Chromium††	7440473		1*	2		D	5000 (2270)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Cate-gory	Final RQ Pounds (Kg)
HROMIUM AND COMPOUNDS	N/A		1*	2			**
romous chloride	10049055		1000	1		C	1000 (454)
rysene	218019	1,2 Benzphenanthrene	1*	2,4	U050	B	100 (45 4)
obaltous bromide	7789437		1000	1		C	1000 (454)
obaltous formate	544183		1000	1		C	1000 (454)
obaltous sulfamate	14017415		1000	1		C	1000 (454)
oke Oven Emissions	N/A		1*	3		X	1 (0 454)
opper cyanide CuCN	544923	Copper cyanide	1*	4	P029	A	10 (4.54)
opper††	7440508		1*	2		D	5000 (2270)
OPPER AND COMPOUNDS	N/A		1*	2			**
opper cyanide	544923	Copper cyanide CuCN	1*	4	P029	A	10 (4 54)
oumaphos	56724		10	1		A	10 (4 54)
eosote	8001589		1*	4	U051	X	1 (0 454)
esol(s)	1319773	Cresylic acid Phenol, methyl-	1000	1,4	U052	C	1000 (454)
n-Cresol	108394	m-Cresylic acid	1000	1,4	U052	C	1000 (454)
o-Cresol	95487	o-Cresylic acid	1000	1,4	U052	C	1000 (454)
p-Cresol	106445	p-Cresylic acid	1000	1,4	U052	C	1000 (454)
esylic acid	1319773	Cresol(s) Phenol, methyl-	1000	1,4	U052	C	1000 (454)
n-Cresol	108394	m-Cresylic acid	1000	1,4	U052	C	1000 (454)
o-Cresol	95487	o-Cresylic acid	1000	1,4	U052	C	1000 (454)
p-Cresol	106445	p-Cresylic acid	1000	1,4	U052	C	1000 (454)
rotonaldehyde	123739	2-Butenal	100	1,4	U053	B	100 (45 4)
	4170303						
umene	98828	Benzene, 1-methylethyl-	1*	4	U055	D	5000 (2270)
upric acetate	142712		100	1		B	100 (45 4)
upric acetoarsenite	12002038		100	1		X	1 (0 454)
upric chloride	7447394		10	1		A	10 (4 54)
upric nitrate	3251238		100	1		B	100 (45 4)
upric oxalate	5893663		100	1		B	100 (45 4)
upric sulfate	7758987		10	1		A	10 (4.54)
upric sulfate, ammoniated	10380297		100	1		B	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
Cupric tartrate	815827		100	1		B	100 (45.4)
CYANIDES	N/A		1*	2			**
Cyanides (soluble salts and complexes) not otherwise specified	57125		1*	4	P030	A	10 (4 54)
Cyanogen	460195	Ethanedinitrile	1*	4	P031	B	100 (45 4)
Cyanogen bromide	506683	Cyanogen bromide (CN)Br	1*	4	U246	C	1000 (454)
Cyanogen bromide (CN)Br	506683	Cyanogen bromide	1*	4	U246	C	1000 (454)
Cyanogen chloride	506774	Cyanogen chloride (CN)Cl	10	1,4	P033	A	10 (4 54)
Cyanogen chloride (CN)Cl	506774	Cyanogen chloride	10	1,4	P033	A	10 (4 54)
2,5-Cyclohexadiene-1,4-dione	106514	p-Benzoquinone	1*	4	U197	A	10 (4 54)
Cyclohexane	110827	Benzene, hexahydro-	1000	1,4	U056	C	1000 (454)
Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1alpha, 2alpha, 3beta,4alpha,5alpha,6,beta)-	58899	gamma—BHC	1	1,2,4	U129	X	1 (0 454)
Cyclohexanone	108941		1*	4	U057	D	5000 (2270)
2-Cyclohexyl-4,6-dinitrophenol	131895	Phenol, 2-cyclohexyl-4,6-dinitro-	1*	4	P034	B	100 (45 4)
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77474	Hexachlorocyclopentadiene	1	1,2,4	U130	A	10 (4 54)
Cyclophosphamide	50180	2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl) tetrahydro-,2-oxide	1*	4	U058	A	10 (4 54)
2,4-D Acid	94757	Acetic acid (2,4-dichlorophenoxy)- 2,4-D, salts and esters	100	1,4	U240	B	100 (45 4)
2,4-D Ester	94111		100	1		B	100 (45 4)
	94791		100	1		B	100 (45 4)
	94804		100	1		B	100 (45 4)
	1320189		100	1		B	100 (45 4)
	1928387		100	1		B	100 (45 4)
	1928616		100	1		B	100 (45 4)
	1929733		100	1		B	100 (45 4)
	2971382		100	1		B	100 (45 4)
	25168267		100	1		B	100 (45 4)
	53467111		100	1		B	100 (45 4)
2,4-D, salts and esters	94757	Acetic acid (2,4-dichlorophenoxy)- 2,4-D Acid	100	1,4	U240	B	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
unomycin	20830813	5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6- trideoxy-alpha-L-lyxo-hexo-pyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-	1*	4	U059	A	10 (4.54)
D	72548	Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro- TDE 4,4' DDD	1	1,2,4	U060	X	1 (0 454)
' DDD	72548	Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro- DDD TDE	1	1,2,4	U060	X	1 (0 454)
E	72559	4,4' DDE	1*	2		X	1 (0 454)
' DDE	72559	DDE	1*	2		X	1 (0 454)
T	50293	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro- 4,4'DDT	1	1,2,4	U061	X	1 (0 454)
' DDT	50293	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro- DDT	1	1,2,4	U061	X	1 (0 454)
T AND METABOLITES	N/A		1*	2			**
llate	2303164	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,-dich-loro-2-propenyl) ester	1*	4	U062	B	100 (45 4)
zinon	333415		1	1		X	1 (0 454)
enz[a,h]anthracene	53703	Dibenzo[a,h]anthracene 1,2 5,6-Dibenzanthracene	1*	2,4	U063	X	1 (0 454)
-5,6-Dibenzanthracene	53703	Dibenz[a,h]anthracene Dibenzo[a,h]anthracene	1*	2,4	U063	X	1 (0 454)
enzo[a,h]anthracene	53703	Dibenz[a,h]anthracene 1,2 5,6-Dibenzanthracene	1*	2,4	U063	X	1 (0 454)
enz[a,i]pyrene	189559	Benzo[rst]pentaphene	1*	4	U064	A	10 (4 54)
-Dibromo-3-chloropropane	96128	Propane, 1,2-dibromo-3-chloro-	1*	4	U066	X	1 (0 454)
utyl phthalate	84742	Dibutyl phthalate n-Butyl phthalate 1,2-Benzenedicarboxylic acid, dibutyl ester	100	1,2,4	U069	A	10 (4 54)
n-butyl phthalate	84742	Dibutyl phthalate n-Butyl phthalate 1,2-Benzenedicarboxylic acid, dibutyl ester	100	1,2,4	U069	A	10 (4.54)
amba	1918009		1000	1		C	1000 (454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Dichlobenil	1194656		1000	1		B	100 (45 4
Dichlone	117806		1	1		X	1 (0 454
Dichlorobenzene	25321226		100	1		B	100 (45 4
1,2-Dichlorobenzene	95501	Benzene, 1,2-dichloro- o-Dichlorobenzene	100	1,2,4	U070	B	100 (45 4
1,3-Dichlorobenzene	541731	Benzene, 1,3-dichloro m-Dichlorobenzene	1*	2,4	U071	B	100 (45 4
1,4-Dichlorobenzene	106467	Benzene, 1,4-dichloro p-Dichlorobenzene	100	1,2,4	U072	B	100 (45 4)
m Dichlorobenzene	541731	Benzene, 1,3-dichloro 1,3-Dichlorobenzene	1*	2,4	U071	B	100 (45 4)
o-Dichlorobenzene	95501	Benzene, 1,2-dichloro 1,2-Dichlorobenzene	100	1,2,4	U070	B	100 (45 4)
p-Dichlorobenzene	106467	Benzene, 1,4-dichloro 1,4-Dichlorobenzene	100	1,2,4	U072	B	100 (45 4)
DICHLOROBENZIDINE	N/A		1*	2			**
3,3'-Dichlorobenzidine	91941	[1,1'-Biphenyl]-4,4'diamine,3,3'dichloro-	1*	2,4	U073	X	1 (0 454)
Dichlorobromomethane	75274		1*	2		D	5000 (2270)
1,4-Dichloro-2-butene	764410	2-Butene, 1,4-dichloro-	1*	4	U074	X	1 (0 454)
Dichlorodifluoromethane	75718	Methane, dichlorodifluoro-	1*	4	U075	D	5000 (2270)
1,1-Dichloroethane	75343	Ethane, 1,1-dichloro- Ethylidene dichloride	1*	2,4	U076	C	1000 (454)
1,2-Dichloroethane	107062	Ethane, 1,2-dichloro- Ethylene dichloride	5000	1,2,4	U077	B	100 (45 4)
1,1-Dichloroethylene	75354	Ethene, 1,1-dichloro- Vinylidene chloride	5000	1,2,4	U078	B	100 (45 4)
1,2-Dichloroethylene	156605	Ethene 1,2-dichloro- (E)	1*	2,4	U079	C	1000 (454)
Dichloroethyl ether	111444	Bis (2-chloroethyl) ether Ethane, 1,1'-oxybis[2-chloro-	1*	2,4	U025	A	10 (4 54)
Dichloroisopropyl ether	108601	Propane, 2,2'-oxybis[2-chloro-	1*	2,4	U027	C	1000 (454)
Dichloromethoxy ethane	111911	Bis(2-chloroethoxy) methane Ethane, 1,1'-[methylenebis(oxy)] bis(2-chloro-	1*	2,4	U024	C	1000 (454)
Dichloromethyl ether	542881	Methane, oxybis(chloro-	1*	4	P016	A	10 (4 54)
2,4 Dichlorophenol	120832	Phenol, 2,4-dichloro-	1*	2,4	U081	B	100 (45 4)
2,6 Dichlorophenol	87650	Phenol, 2,6-dichloro-	1*	4	U082	B	100 (45 4)
Dichlorophenylarsine	696286	Arsonous dichloride, phenyl-	1*	4	P036	X	1 (0.454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
hloropropane	26638197		5000	1		C	1000 (454)
,1-Dichloropropane	78999		5000	1		C	1000 (454)
,3-Dichloropropane	142289		5000	1		C	1000 (454)
-Dichloropropane	78875	Propane, 1,2-dichloro- Propylene dichloride	5000	1,2,4	U083	C	1000 (454)
hloropropane—Dichloropropene xture)	8003198		5000	1		B	100 (45.4)
hloropropene	26952238		5000	1		B	100 (45 4)
,3-Dichloropropene	78886		5000	1		B	100 (45 4)
-Dichloropropene	542756	1-Propene, 1,3-dichloro-	5000	1,2,4	U084	B	100 (45 4)
-Dichloropropionic acid	75990		5000	1		D	5000 (2270)
hlorvos	62737		10	1		A	10 (4 54)
ofol	115322		5000	1		A	5000 (2270)
ldrin	60571	2,7.3,6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta, 6beta,6aalpha,7beta, 7aalpha)-	1	1,2,4	P037	X	1 (0 454)
3,4-Diepoxybutane	1464535	2,2'-Bioxirane	1*	4	U085	A	10 (4.54)
thylamine	109897		1000	1		B	100 (454 4)
thylarsine	692422	Arsine, diethyl-	1*	4	P038	X	1 (0 454)
-Diethylenedioxide	123911	1,4-Dioxane	1*	4	U108	B	100 (45.4)
thylhexyl phthalate	117817	Bis (2-ethylhexyl)phthalate 1,2,-Benzenedicarboxylic acid, [bis(2-ethylhexyl)] ester	1*	2,4	U028	B	100 (45.4)
N-'Diethylhydrazine	1615801	Hydrazine, 1,2-diethyl-	1*	4	U086	A	10 (4.54)
)-Diethyl S-methyl iophosphate	3288582	Phosphorodithioic acid, O,O-diethyl S-methyl ester	1*	4	U087	D	5000 (2270)
thyl-p-nitrophenyl phosphate	311455	Phosphoric acid, diethyl 4-nitrophenyl ester	1*	4	P041	B	100 (45 4)
thyl phthalate	84662	1,2-Benzenedicarboxylic acid, diethyl ester	1*	2,4	U088	C	1000 (454)
)-Diethyl O-pyrazinyl osphorothioate	297972	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	1*	4	P040	B	100 (45.4)
thylstilbestrol	56531	Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	1*	4	U089	X	1 (0 454)
ydrosafrole	94586	1,3-Benzodioxole, 5-propyl-	1*	4	U090	A	10 (4.54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Diisopropylfluorophosphate	55914	Phosphorofluoridic acid, bis(1-methylethyl) ester	1*	4	P043	B	100 (45 4)
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha,' 8alpha,	309002	Aldrin	1	1,2,4	P004	X	1 (0 454)
8abeta)-1,4,5,8-Dimenthanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro,(1alpha,4alpha,4abeta, 5abeta,8beta,	465736	Isodrin	1*	4	P060	X	1 (0.454)
8abeta)-2,7.3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3, 6,6a,7,7a-octahydro-, (1aalpha, 2beta,2aalpha,3beta,6beta,	60571	Dieldrin	1	1,2,4	P037	X	1 (0 454)
6aalpha,7beta,7aalpha)-2,7 3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3, 6,6a,7,7a-octa hydro-,(1aalpha, 2beta,2abeta,3alpha,6alpha,	72208	Endrin Endrin & metabolites	1	1,2,4	P051	X	1 (0 454)
6abeta,7beta,7aalpha)-Dimethoate	60515	Phosphorodithioic acid, O,O-dimethyl S-[2(methyla-mino)-2-oxoethyl] ester	1*	4	P044	A	10 (4 54)
3,3'-Dimethoxybenzidine	119904	[1,1'-Biphenyl]-4,4'diamine,3, 3'dimethyoxy-	1*	4	U091	B	100 (45 4)
Dimethylamine	124403	methanamine, N-methyl	1000	1,4	U092	C	1000 (454)
p-Dimethylaminoazobenzene	60117	Benzenamine, N,N-dimethyl-4-(phenylazo-)	1*	4	U093	A	10 (4 54)
7,12-Dimethylbenz[a]anthracene	57976	Benz[a]anthracene, 7,12-dimethyl-	1*	4	U094	X	1 (0 454)
3,3'-Dimethylbenzidine	119937	[1,1'Biphynyl]-4,4'diamine,3,3'-dimethyl-	1*	4	U095	A	10 (4.54)
alpha,alpha-Dimethylbenzylhydroperoxide	80159	Hydroperoxide, 1-mehtyl-1-phenylethyl-	1*	4	U096	A	10 (4.54)
Dimethylcarbamoyl chloride	79447	Carbamic chloride, dimethyl-	1*	4	U097	X	1 (0 454)
1,1-Dimethylhydrazine	57147	Hydrazine, 1,1-dimethyl-	1*	4	U098	A	10 (4 54)
1,2-Dimethylhydrazine	540738	Hydrazine, 1,2-dimethyl-	1*	4	U099	X	1 (0 454)
alpha,alpha-Dimethylphenethylamine	122098	Benzeneethanamine, alpha,alpha-dimethyl-	1*	4	P046	D	5000 (2270)
2,4-Dimethylphenol	105679	Phenol, 2,4-dimethyl-	1*	2,4	U101	B	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
ıethyl phthalate	131113	1,2-Benzenedicarboxylic acid, dimethyl ester	1*	2,4	U102	D	5000 (2270)
ıethyl sulfate	77781	Sulfuric acid, dimethyl ester	1*	4	U103	B	100 (45 4)
ıtrobenzene (mixed)	25154545		1000	1		B	100 (45 4)
-Dinitrobenzene	99650		1000	1		B	100 (45 4)
Dinitrobenzene	528290		1000	1		B	100 (45 4)
Dinitrobenzene	100254		1000	1		B	100 (45.4)
-Dinitro-o-cresol and salts	534521	Phenol, 2-methyl-4,6-dinitro-	1*	2,4	P047	A	10 (4.54)
ıtrophenol	25550587		1000	1		A	10 (4.54)
,5-Dinitrophenol	329715		1000	1		A	10 (4 54)
,6-Dinitrophenol	573568		1000	1		A	10 (4.54)
-Dinitrophenol	51285	Phenol, 2,4-dinitro-	1000	1,2,4	P048	A	10 (4 54)
ıtrotoluene	25321146		1000	1,2		A	10 (4 54)
,4-Dinitrotoluene	610399						
-Dinitrotoluene	121142	Benzene, 1-methyl-2,4-dinitro-	1000	1,2,4	U105	A	10 (4 54)
-Dinitrotoluene	606202	Benzene, 2-methyl-1,3-dinitro-	1000	1,2,4	U106	B	100 (45 4)
ıoseb	88857	Phenol, 2-(1-methylpropyl)-4,6-dinitro	1*	4	P020	C	1000 (454)
n-octyl phthalate	117840	1,2-Benzenedicarboxylic acid, dioctyl ester	1*	2,4	U107	D	5000 (2270)
ł-Dioxane	123911	1,4-Diethylenedioxide	1*	4	U108	B	100 (45 4)
?HENYLHYDRAZINE	N/A		1*	2			**
2-Diphenylhydrazine	122667	Hydrazine, 1,2-diphenyl	1*	2,4	U109	A	10 (4.54)
›hosphoramide, octamethyl-	152169	Octamethylpyrophosphoramide	1*	4	P085	B	100 (45 4)
›hosphoric acid, tetraethyl ester	107493	Tetraethyl pyrophosphate	100	1,4	P111	A	10 (4 54)
›ropylamine	142847	1-Propanamine, N-propyl-	1*	4	U110	D	5000 (2270)
-n-propylnitrosamine	621647	1-Propanamine, N-nitroso-N-propyl-	1*	2,4	U111	A	10 (4 54)
quat	85007		1000	1		C	1000 (454)
	2764729		1000	1		C	1000 (454)
sulfoton	298044	Phosphorodithioic acid, o,o-diethyl S-[2-(ethylthio)ethyl]ester	1	1,4	P039	X	1 (0 454)
thiobiuret	541537	Thiomidodicarbonic diamide [(H2N) C(S)]2NH	1*	4	P049	B	100 (45.4)
ıuron	330541		100	1		B	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Dodecylbenzenesulfonic acid	27176870		1000	1		C	1000 (454)
Endosulfan	115297	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	1	1,2,4	P050	X	1 (0 454)
alpha - Endosulfan	959988		1*	2		X	1 (0 454)
beta - Endosulfan	33213659		1*	2		X	1 (0 454)
ENDOSALFAN AND METABOLITES	N/A		1*	2			**
Endosulfan sulfate	1031078		1*	2		X	1 (0 454)
Endothall	145733	7-Oxabicyclo[2 2 1]heptane-2,3-dicarboxylic acid	1*	4	P088	C	1000 (454)
Endrin	72208	Endrin, & metabolites 2,7.3,6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9 -hexachloro-1a,2,2a,3,6,6a,7,7a-octa-hydro-, (1 aalpha, 2beta,2abeta,3alpha, 6alpha,6abeta,7beta, 7aalpha)-	1	1,2,4	P051	X	1 (0 454)
Endrin aldehyde	7421934		1*	2		X	1 (0 454)
ENDRIN AND METABOLITES	N/A		1*	2			**
Endrin, & metablites	72208	Endrin 2,7.3,6-Dimethanonaphth[2,3-b] oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octa-hydro-, (1 aalpha,2beta, 2abeta,3alpha, 6alpha, ... 6abeta,7beta, 7aalpha)-	1	1,2,4	P051	X	1 (0 454)
Epichlorohydrin	106898	Oxirane, (chloromethyl)-	1000	1,4	U041	B	100 (45 4)
Epinephrine	51434	1,2-Benzenediol,4-[1-hydroxy-2-(methylamino)ethyl]-	1*	4	P042	C	1000 (454)
Ethanal	75070	Acetaldehyde	1000	1,4	U001	C	1000 (454)
Ethanamine, N-ethyl-N-nitroso-	55185	N-Nitrosodiethylamine	1*	4	U174	X	1 (0 454)
1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	91805	Methapyrilene	1*	4	U155	D	5000 (2270)
Ethane, 1,2-dibromo-	106934	Ethylene dibromide	1000	1,4	U067	X	1 (0 454)
Ethane, 1,1-dichloro-	75343	Ethylidene dichloride 1,1-Dichloroethane	1*	2,4	U076	C	1000 (454)
Ethane, 1,2-dichloro-	107062	Ethylene dichloride 1,2-Dichlorethane	5000	1,2,4	U077	B	100 (45 4)
Ethanedinitrile	460195	Cyanogen	1*	4	P031	B	100 (45 4)

			Statutory			Final RQ	
Hazardous Substance	**CASRN**	**Regulatory Synonyms**	**RQ**	**Code†**	**RCRA Waste #**	**Cate-gory**	**Pounds (Kg)**
ıane, hexachloro-	67721	Hexachloroethane	1*	2,4	U131	B	100 (45 4)
ıane, 1,1'-ıethylenebis(oxy)]bis(2-hloro-	111911	Bis(2-chloroethoxy) methane Dichloromethoxy ethane	1*	2,4	U024	C	1000 (454)
ıane, 1,1'-oxybis-	60297	Ethyl ether	1*	4	U117	B	100 (45 4)
ıane, 1,1'-oxybis[2-chloro-	111444	Bis (2-chloroethyl) ether Dichloroethyl ether	1*	2,4	U025	A	10 (4.54)
ıane, pentachloro-	76017	Pentachloroethane	1*	4	U184	A	10 (4.54)
ıane, 1,1,1,2-tetrachloro	630206	1,1,1,2-Tetrachloroethane	1*	4	U208	B	100 (45 4)
ıane, 1,1,2,2-tetrachloro	79345	1,1,2,2-Tetrachloroethane	1*	2,4	U209	B	100 (45 4)
ıanethioamide	62555	Thioacetamide	1*	4	U218	A	10 (4 54)
hane, 1,1,1-trichloro	71556	Methyl chloroform 1,1,1-Trichloroethane	1*	2,4	U226	C	1000 (454)
hane, 1,1,2-trichloro-	79005	1,1,2-Trichloroethane	1*	2,4	U227	B	100 (45 4)
hanimidothioic acid, N-[[(methyl-nino)carbonyl]oxy]-, methyl ester	16752775	Methomyl	1*	4	P066	B	100 (45.4)
hanol, 2-ethoxy-	110805	Ethylene glycol monoethyl ether	1*	4	U359	C	1000 (454)
hanol, 2,2'-(nitrosoimino)bis-	1116547	N-Nitrosodiethanolamine	1*	4	U173	X	1 (0 454)
hanone, 1-phenyl-	98862	Acetophenone	1*	4	U004	D	5000 (2270)
hene, chloro-	75014	Vinyl chloride	1*	2,3,4	U043	X	1 (0 454)
hene, 2-Cloroethoxy-	110758	2-Chloroethyl vinyl ether	1*	2,4	U042	C	1000 (454)
hene, 1,1-dichloro-	75354	Vinylidene chloride 1,1-Dichloroethylene	5000	1,2,4	U078	B	100 (45 4)
hene, 1,2-dichloro-	156605	1,2-Dichloroethylene	1*	2,4	U079	C	1000 (45 4)
hene, tetrachloro-	127184	Perchloroethylene Tetrachlorethene Tetrachloroethylene	1*	2,4	U210	B	100 (45 4)
hene, trichloro-	79016	Trichloroethene Trichloroethylene	1000	1,2,4	U228	B	100 (45 4)
hion	563122		10	1		A	10 (4 54)
hyl acetate	141786	Acetic acid, ethyl ester	1*	4	U112	D	5000 (2270)
hyl acrylate	140885	2-Propenoic acid, ethyl ester	1*	4	U113	C	1000 (454)
hylbenzene	100414		1000	1,2		C	1000 (454)
hyl carbamate (urethane)	51796	Carbamic acid, ethyl ester	1*	4	U238	B	100 (45 4)
hyl cyanide	107120	Propanenitril	1*	4	P101	A	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Ethylenebisdithiocarbamic acid, salts & esters	111546	Carbamodithioic acid, 1,2-ethanediylbis, salts & esters	1*	4	U114	D	5000 (2270)
Ethylenediamine	107153		1000	1		D	5000 (2270)
Ethylenediamine-tetraacetic acid (EDTA)	60004		5000	1		D	5000 (2270)
Ethylene dibromide	106934	Ethane, 1,2-dibromo-	1000	1,4	U067	X	1 (0 454)
Ethylene dichloride	107062	Ethane, 1,2-dichloro- 1,2-Dichloroethane	5000	1,2,4	U077	B	100 (45 4)
Ethylene glycol monoethy ether	110805	Ethanol, 2-ethoxy-	1*	4	U359	C	1000 (454)
Ethylene oxide	75218	Oxirane	1*	4	U115	A	10 (4.54)
Ethylenethiourea	96457	2-Imidazolidinethione	1*	4	U116	A	10 (4 54)
Ethylenimine	151564	Aziridine	1*	4	P054	X	1 (0 454)
Ethyl ether	60297	Ethane, 1,1'-oxybis	1*	4	U117	B	100 (45 4)
Ethylidene dichloride	75343	Ethane, 1,1'-dichloro- 1,1-Dichloroethane	1*	2,4	U076	C	1000 (454)
Ethyl methacrylate	97632	2-Propenoic acid, 2-methyl-, ethyl ester	1*	4	U118	C	1000 (454)
Ethyl methanesulfonate	62500	Methanesulfonic acid, ethyl ester	1*	4	U119	X	1 (0 454)
Famphur	52857	Phosphorothioic acid, O,[4-[(di-methylamino) sulfonyl] phenyl] O,O-dimethyl ester	1*	4	P097	C	1000 (454)
Ferric ammonium citrate	1185575		1000	1		C	1000 (454)
Ferric ammonium oxalate	2944674		1000	1		C	1000 (454)
	55488874		1000	1		C	1000 (454)
Ferric chloride	7705080		1000	1		C	1000 (454)
Ferric flouride	7783508		100	1		B	100 (45 4)
Ferric nitrate	10421484		1000	1		C	1000 (454)
Ferric sulfate	10028225		1000	1		C	1000 (454)
Ferrous ammonium sulfate	10045893		1000	1		C	1000 (454)
Ferrous chloride	7758943		100	1		B	100 (45 4)
Ferrous sulfate	7720787		1000	1		C	1000 (454)
	7782630		1000	1		C	1000 (454)
Flouranthene	206440	Benzo[j,k]flourene	1*	2,4	U120	B	100 (45 4)
Flourene	86737		1*	2		D	5000 (2270)
Flourine	7782414		1*	4	P056	A	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
ouroacetamide	640197	Acetamide, 2-fluoro-	1*	4	P057	B	100 (45 4)
ouracetic acid, sodium salt	62748	Acetic acid, fluoro-, sodium salt	1*	4	P058	A	10 (4.54)
ɔrmaldehyde	50000		1000	1,4	U122	B	100 (45 4)
ɔrmic acid	64186		5000	1,4	U123	D	5000 (2270)
ılminic acid, mercury(2+)salt	628864	Mercury fulminate	1*	4	P065	A	10 (4.54)
ımaric acid	110178		5000	1		D	5000 (2270)
ıran	110009	Furfuran	1*	4	U124	B	100 (45 4)
ıran, tetrahydro-	109999	Tetrahydrofuran	1*	4	U213	C	1000 (454)
Furancarboxaldehyde	98011	Furfural	1000	1,4	U125	D	5000 (2270)
,5-Furandione	108316	Maleic anhydride	5000	1,4	U147	D	5000 (2270)
ırfural	98011	2-Furancarboxaldehyde	1000	1,4	U125	D	5000 (2270)
ırfuran	110009	Furan	1*	4	U124	B	100 (45 4)
lucopyranose, 2-deoxy-2-(3-ıethyl-3-nitrosoureido)-	18883664	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino] Streptozotocin	1*	4	U206	X	1 (0.454)
Glucose, 2-deoxy-2-methylnitrosoamino)-ırbonyl]amino]-	18883664	Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	1*	4	U206	X	1 (0.45)
ycidylaldehyde	765344	Oxiranecarboxyaldehyde	1*	4	U126	A	10 (4.54)
uanidien, N-methyl-N'-nitro-N-troso-	70257	MNNG	1*	4	U163	A	10 (4 54)
uthion	865500		1	1		X	1 (0 454)
ALOETHERS	N/A		1*	2			**
ALOMETHANES	N/A		1*	2			**
eptachlor	76448	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	1	1,2,4	P059	X	1 (0 454)
EPTACHLOR AND METABOLITES	N/A		1*	2			**
eptachlor epoxide	1024573		1*	2		X	1 (0.454)
exachlorobenzene	118741	Benzene, hexachloro-	1*	2,4	U127	A	10 (4.54)
exachlorobutadiene	87683	1,3-Butadiene, 1,1,2,3,4,5-hexachloro-	1*	2,4	U128	X	1 (0 454)
EXACHLOROCYCLOHEXANE (all omers)	608731		1*	2			**

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Hexachlorocyclohexane (gammer isomer)	58899	Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1alpha,2alpha,3beta,4alpha,5alpha,6beta)-gamma-BHC Lindane	1	1,2,4	U129	X	1 (0 454)
Hexachlorocyclopentadiene	77474	1,3-Cyclopentadiene,1,2,3,4,5,5-hexachloro-	1	1,2,4	U130	A	10 (4 54)
Hexachloroethane	67721	Ethane, hexachloro-	1*	2,4	U131	B	100 (45 4)
Hexachlorophene	70304	Phenol, 2,2'-methylenebis[3,4,5-trichloro-	1*	4	U132	B	100 (45 4)
Hexachloropropene	1888717	1-Propene, 1,1,2,3,3,3-hexachloro-	1*	4	U243	C	1000 (454)
Hexaethyl tetraphosphate	757584	Tetraphosphoric acid, hexaethyl ester	1*	4	P062	B	100 (45 4)
Hydrazine	302012		1*	4	U133	X	1 (0 454)
Hydrazine, 1,2-diethyl-	1615801	N,N'-Diethylhydrazine	1*	4	U086	A	10 (4 54)
Hydrazine, 1,1-dimethyl-	57147	1,1-Dimethylhydrazine	1*	4	U098	A	10 (4 54)
Hydrazine, 1,2-dimethyl-	540738	1,2-Dimethylhydrazine	1*	4	U099	X	1 (0 454)
Hydrazine, 1,2-diphenyl-	122667	1,2-Diphenylhydrazine	1*	2,4	U109	A	10 (4 54)
Hydrazine, methyl-	60344	Methyl hydrazine	1*	4	P068	A	10 (4 54)
Hydrazinecarbothioamide	79196	Thiosemicarbazide	1*	4	P116	B	100 (45 4)
Hydrochloric acid	7647010	Hydrogen chloride	5000	1		D	5000 (2270)
Hydrocyanic acid	74908	Hydrogen cyanide	10	1,4	P063	A	10 (4 54)
Hydrofluoric acid	7664393	Hydrogen flouride	5000	1,4	U134	B	100 (45 4)
Hydrogen chloride	7647010	Hydrochloric acid	5000	1		D	5000 (2270)
Hydrogen cyanide	74908	Hydrocyanic acid	10	1,4	P063	A	10 (4 54)
Hydrogen fluoride	7664393	Hydrofluoric acid	5000	1,4	U134	B	100 (45 4)
Hydrogen sulfide	7783064	Hydrogen sulfide H2S	100	1,4	U135	B	100 (45 4)
Hydrogen sulfide H2S	7783064	Hydrogen sulfide	100	1,4	U135	B	100 (45 4)
Hydroperoxide, 1-methyl-1-phenylethyl-	80159	alpha,alpha-Dimethylbenzylhydroperoxide	1*	4	U096	A	10 (4 54)
2-Imidazolidinethione	96457	Ethylenethiourea	1*	4	U116	A	10 (4 54)
Indeno(1,2,3-cd)pyrene	193395	1,10-(1,2-Phenylene)pyrene	1*	2,4	U137	B	100 (45 4)
1,3-Isobenzofurandione	85449	Phthalic anhydride	1*	4	U190	D	5000 (2270)
Isobutyl alcohol	78831	1-Propanol, 2-methyl-	1*	4	U140	D	5000 (2270)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
rin	465736	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a, 5,8,8a-hexahydro,(1alpha,4alpha, 4abeta,5beta,8beta,8abeta)-	1*	4	P060	X	1 (0 454)
horone	78591		1*	2		D	5000 (2270)
rene	78795		1000	1		B	100 (45 4)
ropanolamine ecylbenzenesulfonate	42504461		1000	1		C	1000 (454)
afrole	120581	1,3-Benzodioxole,5-)1-propenly)-	1*	4	U141	B	100 (45 4)
H)-Isoxazolone, 5- inomethyl)-	2763964	Muscimol 5-(Aminomethyl)-3-isoxazolol	1*	4	P007	C	1000 (454)
one	143500	1,2,4-Metheno-2H-cyclobuta[cd] pentalen-2-one,1,1a,3,3a,4,5,5, 5a,5b,6-decachlorooctahydro-	1	1,4	U142	X	1 (0 454)
ocarpine	303344	2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5, 7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z), 7(2S*,3R*), 7aalpha]]-	1*	4	U143	A	10 (4 54)
d††	7439921		1*	2	U143	A	10 (4 54)
d acetate	301042	Acetic acid, lead(2+) salt	5000	1,4	U144		#
D AND COMPOUNDS	N/A		1*	2			**
d arsenate	7784409		5000	1		X	1 (0 454)
	7645252		5000	1		X	1 (0 454)
	10102484		5000	1		X	1 (0 454)
d, bis(acetato-O)tetrahydroxytri	1335326	Lead subacetate	1*	4	U146	B	100 (45 4)
d chloride	7758954		5000	1		B	100 (45 4)
d fluoborate	13814965		5000	1		B	100 (45 4)
d fluoride	7783462		1000	1		B	100 (45 4)
ad iodide	10101630		5000	1		B	100 (45 4)
ad nitrate	10099748		5000	1		B	100 (45 4)
ad phosphate	7446277	Phosphoric acid, lead(2+) salt (2 3)	1*	4	U145		#
ad stearate	7428480		5000	1		D	# 5000 (2270)
	1072351		5000	1		D	# 5000 (2270)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
	52652592		5000	1		D	# 5000 (2270)
	56189094		5000	1		D	# 5000 (2270)
Lead subacetate	1335326	Lead, bis(acetato-O)tetrahydroxytri	1*	4	U146	B	100 (45 4)
Lead sulfate	15739807		5000	1		B	100 (45 4)
	7446142		5000	1		B	100 (45 4)
			5000	1		B	100 (45 4)
Lead sulfide	1314870		5000	1		D	# 5000 (2270)
Lead thiocyanate	592870		5000	1		B	100 (45 4)
Lindane	58899	Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1alpha,2alpha,3beta,4alpha,5alpha,6beta)-gamma-BHC Hexachlorocyclohexane (gamma isomer)	1	1,2,4	U129	X	1 (0 454)
Lithium Chromate	14307358		1000	1		A	10 (4 54)
Malathion	121755		10	1		B	100 (45 4)
Maleic acid	110167		5000	1		D	5000 (2270)
Maleic anhydride	108316	2,5-Furandione	5000	1,4	U147	D	5000 (2270)
Maleic hydrazide	123331	3,6-Pyridazinedione, 1,2-dihydro-	1*	4	U148	D	5000 (2270)
Malononitrile	109773	Propanedinitrile	1*	4	U149	C	1000 (454)
Melphalan	148823	L-Phenylalanine, 4-[bis(2-chloroethyl)amino]]	1*	4	U150	X	1 (0 454)
Mercaptodimethur	2032657		100	1		A	10 (4 54)
Mercuric cyanide	592041		1	1		X	1 (0 454)
Mercuric nitrate	10045940		10	1		A	10 (4.54)
Mercuric sulfate	7783359		10	1		A	10 (4 54)
Mercuric thiocyanate	592858		10	1		A	10 (4 54)
Mercurous nitrate	10415755		10	1		A	10 (4.54)
	7782867		10	1		A	10 (4.54)
Mercury	7439976		1*	2,3,4	U151	X	1 (0 454)
MERCURY AND COMPOUNDS	N/A		1*	2			**
Mercury, (acetate O)phenyl	62384	Phenylmercury acetate	1*	4	P092	B	100 (45 4)
Mercury fulminate	628864	Fulminic acid, mercury(2+)salt	1*	4	P065	A	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
thacrylonitrile	126987	2-Propenenitrile,2-methyl-	1*	4	U152	C	1000 (454)
thanamine, N-methyl-	124403	Dimethylamine	1000	1,4	U092	C	1000 (454)
thanamine, N-methyl-N-nitroso-	62759	N-Nitrosodimethylamine	1*	2,4	P082	A	10 (4 54)
thane, bromo-	74839	Methyl bromide	1*	2,4	U029	C	1000 (454)
thane, chloro-	74873	Methyl chloride	1*	2,4	U045	B	100 (45 4)
thane, chloromethoxy-	107302	Chloromethyl methyl ether	1*	4	U046	A	10 (4 54)
thane, dibromo-	74953	Methylene bromide	1*	4	U068	C	1000 (454)
thane, dichloro-	75092	Methylene chloride	1*	2,4	U080	C	1000 (454)
thane, dichlorodifluoro-	75718	Dichlorodifluoromethane	1*	4	U075	D	5000 (2270)
thane, iodo-	74884	Methyl iodide	1*	4	U138	B	100 (45 4)
ethane, isocyanato-	624839	Methyl isocyanate	1*	4	P064		##
ethane, oxybis(chloro-	542881	Dichloromethyl ether	1*	4	P016	A	10 (4 54)
ethanesulfenyl chloride, trichloro-	594423	Trichloromethanesulfenyl chloride	1*	4	P118	B	100 (45 4)
ethanesulfonic acid, ethyl ester	62500	Ethyl methanesulfonate	1*	4	U119	X	1 (0 454)
ethane, tetrachloro-	56235	Carbon tetrachloride	5000	1,2,4	U211	A	10 (4 54)
ethane, tetranitro	509148	Tetranitromethane	1*	4	P112	A	10 (4 54)
ethane, tribromo-	75252	Bromoform	1*	2,4	U225	B	100 (45 4)
ethane, trichloro-	67663	Chloroform	5000	1,2,4	U044	A	10 (4 54)
ethane, trichlorofluoro	75694	Trichloromonofluoromethane	1*	4	U121	D	5000 (2270)
ethanethiol	74931	Methylmercaptan Thiomethanol	100	1,4	U153	B	100 (45.4)
,9-Methano-2,4,3-enzodioxathiepin,6,7,8,9,10,10-exachloro-1,5,5a,6,9,9a-exahydro-, 3-oxide	115297	Endosulfan	1	1,2,4	P050	X	1 (0 454)
,3,4-Metheno-2H-cyclobuta[cd]entalen-2-one, 1,1a,3,3a,4,5,5,a,5b,6-decachloroctahydro-	143500	Kepone	1	1,4	U142	X	1 (0 454)
,7-Methano-1H-indene, 1,4,5,6,,8,8-heptachloro-3a,4,7,7a-etrahydro-	76448	Heptachlor	1	1,2,4	P059	X	1 (0 454)
,7-Methano-1H-indene, 1,2,3,4,,6,8,8-octachloro-2,3,3a,4,5,5a-exahydro-	57749	Chlordane Chlordane, alpha & gamma isomers Chlordane, technical	1	1,2,4	U036	X	1 (0 454)
Methanol	67561	Methyl alcohol	1*	4	U154	D	5000 (2270)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
Methapyrilene	91805	1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	1*	4	U155	D	5000 (2270)
Methomyl	16752775	Ethanimidothioic acid, N-[[(methyl-amino)carbonly]oxy]-, methyl ester	1*	4	P066	B	100 (45 4)
Methoxychlor	72435	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-methoxy-	1	1,4	U247	X	1 (0 454)
Methyl alchohol	67561	Methanol	1*	4	U154	D	5000 (2270)
Methyl bromide	74839	Methane, bromo-	1*	2,4	U029	C	1000 (454)
1-Methylbutadiene	504609	1,3-Pentadiene	1*	4	U186	B	100 (45 4)
Methyl chloride	74873	Methane, chloro-	1*	2,4	U045	B	100 (45 4)
Methyl chlorocarbonate	79221	Carbonochloridic acid, methyl ester Methyl chloroformate	1*	4	U156	C	1000 (454)
Methyl chloroform	71556	Ethane, 1,1,1-trichloro- 1,1,1-Trichloroethane	1*	2,4	U226	C	1000 (454)
Methyl chloroformate	79221	Carbonochloridic acid, methyl ester Methyl chlorocarbonate	1*	4	U156	C	1000 (454)
3 Methylcholanthrene	56495	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	1*	4	U157	A	10 (4.54)
4,4'-Methylenebis(2-chloroaniline)	101144	Benzenamine, 4,4'-methylenebis(2-chloro-	1*	4	U158	A	10 (4 54)
Methylene bromide	74953	Methane, dibromo-	1*	4	U068	C	1000 (454)
Methylene chloride	75092	Methane, dichloro-	1*	2,4	U080	C	1000 (454)
Methyl ethyl ketone (MEK)	78933	2-Butanone	1*	4	U159	D	5000 (2270)
Methyl ethyl ketone peroxide	1338234	2-Butanone peroxide	1*	4	U160	A	10 (4 54)
Methyl hydrazine	60344	Hydrazine, methyl-	1*	4	P068	A	10 (4 54)
Methyl iodide	74884	Methane, iodo-	1*	4	U138	B	100 (45 4)
Methly isobutyl ketone	108101	4-Methyl-2-pentanone	1*	4	U161	D	5000 (2270)
Methyl isocyanate	624839	Methane, isocyanato-	1*	4	P064		##
2 Methyllactonitrile	75865	Acetone cyanohydrin Propanenitrile, 2-hydroxy-2-methyl-	10	1,4	P069	A	10 (4 54)
Methylmercaptan	74931	Methanethiol Thiomethanol	100	1,4	U153	B	100 (45 4)
Methyl methacrylate	80626	2-Propenoic acid, 2-methyl, methyl ester	5000	1,4	U162	C	1000 (454)
Methyl parathion	298000	Phosphorotioic acid,),)-dimethyl O-(4-nitro-phenyl) ester	100	1,4	P071	B	100 (45 4)
4 Methyl-2-pentanone	108101	Methyl isobutyl ketone	1*	4	U161	D	5000 (2270)

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ıthylthiouracil	56042	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	1*	4	U164	A	10 (4.54)
ıvinphos	7786347		1	1		A	10 (4.54)
ıxacarbate	315184		1000	1		C	1000 (454)
tomycin C	50077	Azirino[2',3' 3,4]pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl, [1aS-(1aalpha, 8beta,8aalpha, 8balpha)]-	1*	4	U010	A	10 (4.54)
ИNG	70257	Guanidine, N-methyl-N'-nitro-N-nitroso-	1*	4	U163	A	10 (4.54)
ɔnoethylamine	75047		1000	1		B	100 (45.4)
ɔnomethylamine	74895		1000	1		B	100 (45 4)
ılti Source Leachate			1*	4	F039	X	1 (0 454)
ıscimol	2763964	3(2H)-Isoxazolone, 5-(aminomethyl)- 5-(Amino-methyl)-3-isoxazolol	1*	4	P007	C	1000 (454)
ıled	300765		10	1		A	10 (4.54)
12-Naphthacenedione, 8-acetyl-ı-[3-amino-2,3,6-trideoxy-alpha-yxo-hexopyranosyl)oxy]-,9,10-tetrahydro-6,8,11-ıydroxy-1-methoxy, (8S-cis)-	20830813	Daunomycin	1*	4	U059	A	10 (4 54)
Naphthalenamine	134327	alpha-Naphthylamine	1*	4	U167	B	100 (45.4)
Naphthalenamine	91598	beta-Naphthylamine	1*	4	U168	A	10 (4.54)
ıphthalenamine,N,N'-bis(2-ıloroethyl)-	494031	Chlornaphazine	1*	4	U026	B	100 (45.4)
ıphthalene	91203		5000	1,2,4	U165	B	100 (45 4)
ıphthalene, 2-chloro-	91587	beta-Chloronaphthalene 2-Chloronaphthalene	1*	2,4	U047	D	5000 (2270)
4-Naphthalenedione	130154	1,4-Naphthoquinone	1*	4	U166	D	5000 (2270)
7-Naphthalenedisulfonic acid, 3'-[(3,3'-dimethyl-(1,1'-/phenyl)-4,4'-diyl)-bis(azo)]bis(5-nino-4-hydroxy)tetrasodium salt	72571	Trypan blue	1*	4	U236	A	10 (4 54)
aphthenic acid	1338245		100	1		B	100 (45.4)
,4-Naphthoquinone	130154	1,4-Naphthalenedione	1*	4	U166	D	5000 (2270)
pha-Naphthylamine	134327	1,-Naphthalenamine	1*	4	U167	B	100 (45 4)
ɜta-Naphthylamine	91598	2,-Naphthalenamine	1*	4	U168	A	10 (4.54)

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alpha Naphthylthiourea	86884	Thiourea, 1-naphthalenyl-	1*	4	P072	B	100 (45 4)
Nickel††	7440020		1*	2		B	100 (45 4)
Nickel ammonium sulfate	15699180		5000	1		B	100 (45 4)
NICKEL AND COMPOUNDS	N/A		1*	2			**
Nickel carbonyl	13463393	Nickel carbonyl Ni(CO)4, (T-4)-	1*	4	P073	A	10 (4 54)
Nickel carbonyl Ni(CO)4, (T-4)-	13463393	Nickel carbonyl	1*	4	P073	A	10 (4 54)
Nickel chloride	7718549		5000	1		B	100 (45 4)
	37211055		5000	1		B	100 (45 4)
Nickel cyanide	557197	Nickel cyanide Ni(CN)2	1*	4	P074	A	10 (4 54)
Nickel cyanide Ni(CN)2	557197	Nickel cyanide	1*	4	P074	A	10 (4 54)
Nickel hydroxide	12054487		1000	1		A	10 (4 54)
Nickel nitrate	14216752		5000	1		B	100 (45 4)
Nickel sulfate	7786814		5000	1		B	100 (45 4)
Nicotine, & salts	54115	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-	1*	4	P075	B	100 (45 4)
Nitric acid	7697372		1000	1		C	1000 (454)
Nitric acid, thalium (1+) salt	10102451	Thallium (I) nitrate	1*	4	U217	B	100 (45 4)
Nickel oxide	10102439	Nittrogen oxide NO	1*	4	P076	A	10 (4 54)
p Nitroaniline	100016	Benzenamine, 4-nitro-	1*	4	P077	D	5000 (2270)
Nitrobenzene	98953	Benzene, nitro-	1000	1,2,4	U169	C	1000 (454)
Nitrogen dioxide	10102440	Nitrogen oxide NO2	1000	1,4	P078	A	10 (4 54)
	10544726		1000	1,4	P078	A	10 (4 54)
Nitrogen oxide NO	10102439	Nitric oxide	1*	4	P076	A	10 (4 54)
Nitrogen oxide NO2	10102440	Nitrogen dioxide	1000	1,4	P078	A	10 (4 54)
	10544726						
Nitroglycerine	55630	1,2,3-Propanetriol, trinitrate-	1*	4	P081	A	10 (4 54)
Nitrophenol (mixed)	25154556		1000	1		B	100 (45 4)
m-Nitrophenol	554847					B	100 (45 4)
o Nitrophenol	88755	2-Nitrophenol					
p Nitrophenol	100027	Phenol, 4-nitro- 4-Nitrophenol					
o Nitrophenol	88755	2-Nitrophenol	1000	1,2		B	100 (45 4)
p Nitrophenol	100027	Phenol, 4-nitro- 4-Nitrophenol	1000	1,2,4	U170	B	100 (45 4)

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itrophenol	88755	o-Nitrophenol	1000	1,2		B	100 (45 4)
itrophenol	100027	p-Nitrophenol Phenol, 4-nitro-	1000	1,2,4	U170	B	100 (45 4)
'ROPHENOLS	N/A		1*	2			**
itropropane	79469	Propane, 2-nitro-	1*	4	U171	A	10 (4.54)
ROSAMINES	N/A		1*	2			**
litrosodi-n-butylamine	924163	1-Butanamine, N-butyl-N-nitroso-	1*	4	U172	A	10 (4.54)
litrosodiethanolamine	1116547	Ethanol, 2,2'-(nitrosoimino)bis-	1*	4	U173	X	1 (0 454)
litrosodiethylamine	55185	Ethanamine, N-ethyl-N-nitroso-	1*	4	U174	X	1 (0 454)
itrosodimethylamine	62759	Methanamine, N-methyl-N-nitroso-	1*	2,4	P082	A	10 (4 54)
itrosodiphenylamine	86306		1*	2		B	100 (45 4)
litroso-N-ethylurea	759739	Urea, N-ethyl-N-nitroso-	1*	4	U176	X	1 (0 454)
itroso-N-methylurea	684935	Urea, N-methyl-N-nitroso	1*	4	U177	X	1 (0 454)
itroso-N-methylurethane	615532	Carbamic acid, methylnitroso-, ethyl ester	1*	4	U178	X	1 (0 454)
itrosomethylvinylamine	4549400	Vinlyamine, N-methyl-N-nitroso-	1*	4	P084	A	10 (4 54)
itrosopiperidine	100754	Piperidine, 1-nitroso-	1*	4	U179	A	10 (4 54)
itrosopyrrolidine	930552	Pyrrolidine, 1-nitroso-	1*	4	U180	X	1 (0 454)
otoluene	1321126		1000	1		C	1000 (454)
-Nitrotoluene	99081						
Nitrotoluene	88722						
Nitrotoluene	99990						
itro-o-toluidine	99558	Benzenamine, 2-methyl-5-nitro-	1*	4	U181	B	100 (45 4)
amethylpyrophosphoramide	152169	Diphosphoramide, octamethyl-	1*	4	P085	B	100 (45 4)
nium oxide OsO4 (T-4)-	20816120	Osmium tetroxide	1*	4	P087	C	1000 (454)
nium tetroxide	20816120	Osmium oxide OsO4 (T-4)-	1*	4	P087	C	1000 (454)
xabicyclo[2 2 1]heptane-2,3-arboxylic acid	145733	Endothall	1*	4	P088	C	1000 (454)
-Oxathiolane, 2,2-dioxide	1120714	1,3-Propane sultone	1*	4	U193	A	10 (4.54)
1,3,2-Oxazaphosphorin-2-ine, N,N-bis(2-chloroethyl) ahydro-, 2-oxide	50180	Cyclophosphamide	1*	4	U058	A	10 (4 54)
rane	75218	Ethylene oxide	1*	4	U115	A	10 (4.54)
ranecarboxyaldehyde	765344	Glycidylaldehyde	1*	4	U126	A	10 (4 54)

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Oxirane, (chloromethyl)-	106898	Epichlorohydrin	1000	1,4	U041	B	100 (45 4)
Paraformaldehyde	30525894		1000	1		C	1000 (454)
Paraldehyde	123637	1,3,5-Trioxane, 2,4,6-trimethyl-	1*	4	U182	C	1000 (454)
Parathion	56382	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	1	1,4	P089	A	10 (4 54)
Pentachlorobenzene	608935	Benzene, pentachloro-	1*	4	U183	A	10 (4 54)
Pentachloroethane	76017	Ethane, pentachloro-	1*	4	U184	A	10 (4 54)
Pentachloronitrobenzene (PCNB)	82688	Benzene, pentachloronitro-	1*	4	U185	B	100 (45 4)
Pentachlorophenol	87865	Phenol, pentachloro-	10	1,2,4	U242	A	10 (4 54)
1,3-Pentadiene	504609	1-Methylbutadiene	1*	4	U186	B	100 (45 4)
Perchloroethylene	127184	Ethene, tetrachloro- Tetrachloroethene Tetrachlor-oethylene	1*	2,4	U210	B	100 (45 4)
Phenacetin	62442	Acetamide, N-(4-ethoxyphenyl)-	1*	4	U187	B	100 (45 4)
Phenanthrene	85018		1*	2		D	5000 (2270)
Phenol	108952	Benzene, hydroxy-	1000	1,2,4	U188	C	1000 (454)
Phenol, 2-chloro-	95578	o-Chlorophenol 2-Chlorophenol	1*	2,4	U048	B	100 (45 4)
Phenol, 4-chloro-3-methyl-	59507	p-Chloro-m-cresol 4-Chloro-m-cresol	1*	2,4	U039	D	5000 (2270)
Phenol, 2-cyclohexyl-4,6-dinitro-	131895	2-Cyclohexyl-4,6-dinitrophenol	1*	4	P034	B	100 (45 4)
Phenol, 2,4-dichloro-	120832	2,4-Dichlorophenol	1*	2,4	U081	B	100 (45 4)
Phenol, 2,6-dichloro	87650	2,6-Dichlorophenol	1*	4	U082	B	100 (45 4)
Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	56531	Diethylstilbestrol	1*	4	U089	X	1 (0 454)
Phenol, 2,4-dimethyl-	105679	2,4-Dimethylphenol	1*	2,4	U101	B	100 (45 4)
Phenol, 2,4-dinitro-	51285	2,4-Dinitrophenol	1000	1,2,4	P048	A	10 (4 54)
Phenol, methyl-	1319773	Cresol(s) Cresylic acid	1000	1,4	U052	C	1000 (454)
m Cresol	108394	m-Cresylic acid	1000	1,4	U052	C	1000 (454)
o-Cresol	95487	o-Cresylic acid	1000	1,4	U052	C	1000 (454)
p-Cresol	106445	p-Cresylic acid	1000	1,4	U052	C	1000 (454)
Phenol, 2-methyl-4,6-dinitro-	534521	4,6-Dinitro-o-cresol and salts	1*	2,4	P047	A	10 (4 54)
Phenol, 2,2'-methylenebis[3,4,6-trichloro-	70304	Hexachlorophene	1*	4	U132	B	100 (45 4)
Phenol, 2-(1-methylpropyl)-4,6-dinitro	88857	Dinoseb	1*	4	P020	C	1000 (454)

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ıenol, 4-nitro-	100027	p-Nitrophenol 4-Nitrophenol	1000	1,2,4	U170	B	100 (45 4)
ıenol, pentachloro-	87865	Pentachlorophenol	10	1,2,4	U242	A	10 (4 54)
ıenol, 2,3,4,6-tetrachloro-	58902	2,3,4,6-Tetrachlorophenol	1*	4	U212	A	10 (4.54)
ıenol, 2,4,5-trichloro-	95954	2,4,5-Trichlorophenol	10	1,4	U230	A	10 (4 54)
ıenol, 2,4,6-trichloro-	88062	2,4,6-Trichlorophenol	10	1,2,4	U231	A	10 (4.54)
ıenol, 2,4,6-trinitro-, ammonium ılt	131748	Ammonium picrate	1*	4	P009	A	10 (4.54)
Phenylalanine, 4-[bis(2-ıloroethyl) amino]]	148823	Melphalan	1*	4	U150	X	1 (0.454)
,10-(1,2-Phenylene)pyrene	193395	Indeno(1,2,3-cd)pyrene	1*	2,4	U137	B	100 (45 4)
ıenylmercury acetate	62384	Mercury, (acetato-O)phenyl-	1*	4	P092	B	100 (45 4)
ıenylthiourea	103855	Thiourea, phenyl-	1*	4	P093	B	100 (45 4)
ıorate	298022	Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester	1*	4	P094	A	10 (4 54)
ıosgene	75445	Carbonic dichloride	5000	1,4	P095	A	10 (4.54)
ıosphine	7803512		1*	4	P096	B	100 (45 4)
ıosphoric acid	7664382		5000	1		D	5000 (2270)
ıosphoric acid, diethyl 4-trophenyl ester	311455	Diethyl-p-nitrophenyl phosphate	1*	4	P041	B	100 (45.4)
ıosphoric acid, lead(2+) salt ·.3)	7446277	Lead phosphate	1*	4	U145		#
ıosphorodithioic acid, O,O-diethyl [2-(ethylthio)ethyl]ester	298044	Disulfoton	1	1,4	P039	X	1 (0 454)
ıosphorodithioic acid, O,O-diethyl (ethylthio), methyl ester	298022	Phorate	1*	4	P094	A	10 (4 54)
ıosphorodithioic acid, O,O-diethyl -methyl ester	3288582	O,O-Diethyl S-methyl dithiophosphate	1*	4	U087	D	5000 (2270)
ıosphorodithioic acid, O,O-imethyl S-[2(methylamino)-2-xoethyl] ester	60515	Dimethoate	1*	4	P044	A	10 (4.54)
ıosphorofluoridic acid, bis(1-ıethylethyl) ester	55914	Diisopropylfluorophosphate	1*	4	P043	B	100 (45 4)
hosphorothioic acid, O,O-diethyl ·-(4-nitrophenyl) ester	56382	Parathion	1	1,4	P089	A	10 (4.54)
ıosphorothioic acid, O,[4-dimethylamino)sulfonyl] henyl]O,O-dimethyl ester	52857	Famphur	1*	4	P097	C	1000 (454)

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Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298000	Methyl parathion	100	1,4	P071	B	100 (45 4)
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	297972	O,O-Diethyl O-pyrazinyl phosphorothioate	1*	4	P040	B	100 (45 4)
Phosphorus	7723140		1	1		X	1 (0 454)
Phosphorus oxycloride	10025873		5000	1		C	1000 (454)
Phosphorus pentasulfide	1314803	Phosphorus sulfide Sulfur phosphide	100	1,4	U189	B	100 (45 4)
Phosphorus sulfide	1314803	Phosphorus pentasulfide Sulfur phosphide	100	1,4	U189	B	100 (45 4)
Phosophorus trichloride	7719122		5000	1		C	1000 (454)
PHTHALATE ESTERS	N/A		1*	2			**
Phthalic anhydride	85449	1,3-Isobenzofurandione	1*	4	U190	D	5000 (2270)
2-Picoline	109068	Pyridine, 2-methyl-	1*	4	U191	D	5000 (2270)
Piperidine, 1-nitroso-	100754	N-Nitrosopiperidine	1*	4	U179	A	10 (4 54)
Plumbane, tetraethyl-	78002	Tetraethyl lead	100	1,4	P110	A	10 (4 54)
POLYCHLORINATED BIPHENYLS (PCBs)	1336363		10	1,2		X	1 (0 454)
Aroclor 1016	12674112	POLYCHLORINATED BIPHENYLS (PCBs)					
Aroclor 1221	11104282	POLYCHLORINATED BIPHENYLS (PCBs)					
Aroclor 1232	11141165	POLYCHLORINATED BIPHENYLS (PCBs)					
Aroclor 1242	53469219	POLYCHLORINATED BIPHENYLS (PCBs)					
Aroclor 1248	12672296	POLYCHLORINATED BIPHENYLS (PCBs)					
Aroclor 1254	11097691	POLYCHLORINATED BIPHENYLS (PCBs)					
Aroclor 1260	11096825	POLYCHLORINATED BIPHENYLS (PCBs)					
POLYNUCLEAR AROMATIC HYDROCARBONS	N/A		1*	2			**
Potassium arsenate	7784410		1000	1		X	1 (0 454)
Potassium arsenite	10124502		1000	1		X	1 (0 454)
Potassium bichromate	7778509		1000	1		A	10 (4 54)
Potassium chromate	7789006		1000	1		A	10 (4 54)

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ɔtassium cyanide	151508	Potassium cyanide K (CN)	10	1,4	P098	A	10 (4.54)
ɔtassium cyanide K(CN)	151508	Potassium cyanide	10	1,4	P098	A	10 (4.54)
ɔtassium hydroxide	1310583		1000	1		C	1000 (454)
ɔtassium permanganate	7722647		100	1		B	100 (45 4)
ɔtassium silver cyanide	506616	Argentate (1-), bis(cyano-C)-, potassium	1*	4	P099	X	1 (0 454)
onamide	23950585	Benzamide, 3 5-dichloro-N-(1,1-dimethyl-2-propynyl)-	1*	4	U192	D	5000 (2270)
opanal, 2-methyl-2-(methylthio)-, [(methylamino)carbonyl]oxime	116063	Aldicarb	1*	4	P070	X	1 (0 454)
Propanamine	107108	n-Propylamine	1*	4	U194	D	5000 (2270)
Propanamine, N-propyl-	142847	Dipropylamine	1*	4	U110	D	5000 (2270)
Propanamine, N-nitroso-N-propyl-	621647	Di-n-propylnitrosamine	1*	2,4	U111	A	10 (4 54)
opane, 1,2-dibromo-3-chloro-	96128	1,2-Dibromo-3-chloropropane	1*	4	U066	X	1 (0.454)
opane, 2-nitro-	79469	2-Nitropropane	1*	4	U171	A	10 (4.54)
3-Propane sultone	1120714	1,2-Oxathiolane, 2,2-dioxide	1*	4	U193	A	10 (4.54)
opane, 1,2-dichloro-	78875	Propylene dichloride 1,2 Dichloropropane	5000	1,2,4	U083	C	1000 (454)
opanedinitrile	109773	Malononitrile	1*	4	U149	C	1000 (454)
opanenitrile	107120	Ethyl cynide	1*	4	P101	A	10 (4.54)
opanenitrile, 3-chloro-	542767	3-Chloropropionitrile	1*	4	P027	C	1000 (454)
opanenitrile, 2-hydroxy-2-ethyl-	75865	Acetone cyanohydrin 2-Methyllactonitrile	10	1,4	P069	A	10 (4.54)
opane, 2,2'-oxybis[2-chloro-	108601	Dichloroisopropyl ether	1*	2,4	U027	C	1000 (454)
,2,3-Propanetriol, trinitrate-	55630	Nitroglycerine	1*	4	P081	A	10 (4 54)
Propanol, 2,3-dibromo-, iosphate (3 1)	126727	Tris(2,3-dibromopropyl) phosphate	1*	4	U235	A	10 (4.54)
Propanol, 2-methyl-	78831	Isobutyl alcohol	1*	4	U140	D	5000 (2270)
Propanone	67641	Acetone	1*	4	U002	D	5000 (2270)
Propanone, 1-bromo-	598312	Bromoacetone	1*	4	P017	C	1000 (454)
ropargite	2312358		10	1		A	10 (4.54)
ropargyl alcohol	107197	2-Propyn-1-ol	1*	4	P102	C	1000 (454)
Propenal	107028	Acrolein	1	1,2,4	P003	X	1 (0 454)
Propenamide	79061	Acrylamide	1*	4	U007	D	5000 (2270)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
1-Propene, 1,1,2,3,3,3-hexachloro-	1888717	Hexachloropropene	1*	4	U243	C	1000 (454)
1-Propene, 1,3-dichloro-	542756	1,3-Dichloropropene	5000	1,2,4	U084	B	100 (45 4)
2-Propenenitrile	107131	Acrylonitrile	100	1,2,4	U009	B	100 (45 4)
2-Propenenitrile, 2-methyl-	126987	Methacrylonitrile	1*	4	U152	C	1000 (454)
2-Propenoic acid	79107	Acrylic acid	1*	4	U008	D	5000 (2270)
2-Propenoic acid, ethyl ester	140885	Ethyl acrylate	1*	4	U113	C	1000 (454)
2-Propenoic acid, 2-methyl-, ethyl ester	97632	Ethyl methacrylate	1*	4	U118	C	1000 (454)
2-Propenoic acid, 2-methyl-, methyl ester	80626	Methyl methacrylate	5000	1,4	U162	C	1000 (454)
2 Propen-1-ol	107186	Allyl alcohol	100	1,4	P005	B	100 (45.4)
Propionic acid	79094		5000	1		D	5000 (2270)
Propionic acid, 2-(2,4,5-trichlorophenoxy)-	93721	Silvex (2,4,5-TP) 2,4,5-TP acid	100	1,4	U233	B	100 (45 4)
Propionic anhydride	123626		5000	1		D	5000 (2270)
n-Propylamine	107108	1-Propanamine	1*	4	U194	D	5000 (2270)
Propylene dichloride	78875	Propane, 1,2-dichloro- 1,2-Dichloropropane	5000	1,2,4	U083	C	1000 (454)
Propylene oxide	75569		5000	1		B	100 (45 4)
1,2-Propylenimine	75558	Aziridine, 2-methyl-	1*	4	P067	X	1 (0.454)
2-Propyn-1-ol	107197	Propargyl alcohol	1*	4	P102	C	1000 (454)
Pyrene	129000		1*	2		D	5000 (2270)
Pyrethrins	121299		1000	1		X	1 (0 454)
	121211		1000	1		X	1 (0 454)
	8003347		1000	1		X	1 (0 454)
3,6 Pyridazinedione, 1,2-dihydro-	123331	Maleic hydrazide	1*	4	U148	D	5000 (2270)
4-Pyridinamine	504245	4-Aminopyridine	1*	4	P008	C	1000 (454)
Pyridine	110861		1*	4	U196	C	1000 (454)
Pyridine, 2-methyl-	109068	2-Picoline	1*	4	U191	D	5000 (2270)
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)	54115	Nicotine, & salts	1*	4	P075	B	100 (45 4)
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	66751	Uracil mustard	1*	4	U237	A	10 (4.54)
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56042	Methylthiouracil	1*	4	U164	A	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
rolidine, 1-nitroso-	930552	N-Nitrosopyrrolidine	1*	4	U180	X	1 (0 454)
noline	91225		1000	1		D	5000 (2270)
DIONUCLIDES	N/A		1*	3			§
serpine	50555	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy-, methyl ester (3beta, 16beta, 17alpha, 18beta, 20alpha)-	1*	4	U200	D	5000 (2270)
sorcinol	108463	1,3-Benzenediol	1000	1,4	U201	D	5000 (2270)
ccharin and salts	81072	1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	1*	4	U202	B	100 (45 4)
role	94597	1,3-Benzodioxole, 5-(2-propenyl)-	1*	4	U203	B	100 (45 4)
enious acid	7783008		1*	4	U204	A	10 (4 54)
enious acid, dithallium (1+) salt	12039520	Thallium selenite	1*	4	P114	C	1000 (454)
enium††	7782492		1*	2		B	100 (45 4)
ENIUM AND COMPOUNDS	N/A		1*	2			**
enium dioxide	7446084	Selenium oxide	1000	1,4	U204	A	10 (4.54)
enium oxide	7446084	Selenium dioxide	1000	1,4	U204	A	10 (4 54)
enium sulfide	7488564	Selenium sulfide SeS2	1*	4	U205	A	10 (4.54)
enium sulfide SeS2	7488564	Selenium sulfide	1*	4	U205	A	10 (4 54)
enourea	630104		1*	4	P103	C	1000 (454)
erine, diazoacetate (ester)	115026	Azaserine	1*	4	U015	X	1 (0.454)
ver††	7440224		1*	2		C	1000 (454)
VER AND COMPOUNDS	N/A		1*	2			**
ver cyanide	506649	Silver cyanide Ag(CN)	1*	4	P104	X	1 (0 454)
ver cyanide Ag (CN)	506649	Silver cyanide	1*	4	P104	X	1 (0 454)
ver nitrate	7761888		1	1		X	1 (0 454)
vex (2,4,5-TP)	93721	Propionic acid, 2-(2,4,5-trichlorophenoxy)- 2,4,5-TP acid	100	1,4	U233	B	100 (45 4)
dium	7440235		1000	1		A	10 (4 54)
dium arsenate	7631892		1000	1		X	1 (0 454)
dium arsenite	7784465		1000	1		X	1 (0 454)
dium azide	26628228		1*	4	P105	C	1000 (454)
dium bichromate	10588019		1000	1		A	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Sodium bifluoride	1333831		5000	1		B	100 (45 4)
Sodium bisulfite	7631905		5000	1		D	5000 (2270)
Sodium chromate	7775113		1000	1		A	10 (4 54)
Sodium cyanide	143339	Sodium cyanide Na(CN)	10	1,4	P106	A	10 (4.54)
Sodium cyanide Na (CN)	143339	Sodium cyanide	10	1,4	P106	A	10 (4 54)
Sodium dodecylbenzenesulfonate	25155300		1000	1		C	1000 (454)
Sodium fluoride	7681494		5000	1		C	1000 (454)
Sodium hydrosulfide	16721805		5000	1		D	5000 (2270)
Sodium hydroxide	1310732		1000	1		C	1000 (454)
Sodium hypochlorite	7681529		100	1		B	100 (45 4)
	10022705		100	1		B	100 (45 4)
Sodium methylate	124414		1000	1		C	1000 (454)
Sodium nitrite	7632000		100	1		B	100 (45 4)
Sodium phosphate, dibasic	7558794		5000	1		D	5000 (2270)
	10039324		5000	1		D	5000 (2270)
	10140655		5000	1		D	5000 (2270)
Sodium phosphate, tribasic	7601549		5000	1		D	5000 (2270)
	7758294		5000	1		D	5000 (2270)
	7785844		5000	1		D	5000 (2270)
	10101890		5000	1		D	5000 (2270)
	10124568		5000	1		D	5000 (2270)
	10361894		5000	1		D	5000 (2270)
Sodium selenite	10102188		1000	1		B	100 (45 4)
	7782823						
Streptozotocin	18883664	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl] amino]- Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	1*	4	U206	X	1 (0 454)
Strontium chromate	7789062		1000	1		A	10 (4.54)
Strychnidin-10-one	57249	Strychnine, & salts	10	1,4	P108	A	10 (4 54)
Strychnidin-10-one, 2,3-dimethoxy-	357573	Brucine	1*	4	P018	B	100 (45 4)
Strychnine, & salts	57249	Strychnidin-10-one	10	1,4	P108	A	10 (4.54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
yrene	100425		1000	1		C	1000 (454)
ılfur monochloride	12771083		1000	1		C	1000 (454)
ılfur phosphide	1314803	Phosphorus pentasulfide Phosphorus sulfide	100	1,4	U189	B	100 (45.4)
ulfuric acid	7664939		1000	1		C	1000 (454)
	8014957		1000	1		C	1000 (454)
ulfuric acid, dithallium (1+) salt	7446186	Thallium (I) sulfate	1000	1,4	P115	B	100 (45.4)
	10031591		1000	1,4	P115	B	100 (45.4)
ulfuric acid, dimethyl ester	77781	Dimethyl sulfate	1*	4	U103	B	100 (45.4)
,4,5-T acid	93765	Acetic acid, (2,4,5-trichlorophenoxy) 2,4,5-T	100	1,4	U232	C	1000 (454)
,4,5-T amines	2008460		100	1		D	5000 (2270)
	1319728		100	1		D	5000 (2270)
	3813147		100	1		D	5000 (2270)
	6369966		100	1		D	5000 (2270)
	6369977		100	1		D	5000 (227[illegible]
,4,5-T esters	93798		100	1		C	1000 (454)
	1928478		100	1		C	1000 (454)
	2545597		100	1		C	1000 (454)
	25168154		100	1		C	1000 (454)
	61792072		100	1		C	1000 (454)
,4,5-T salts	13560991		100	1		C	1000 (454)
,4,5-T	93765	Acetic acid, (2,4,5-trichlorophenoxy) 2,4,5-T acid	100	1,4	U232	C	1000 (454)
'DE	72548	Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro- DDD 4,4' DDD	1	1,2,4	U060	X	1 (0 454)
,2,4,5-Tetrachlorobenzene	95943	Benzene, 1,2,4,5-tetrachloro-	1*	4	U207	D	5000 (2270)
,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746016		1*	2		X	1 (0 454)
,1,1,2-Tetrachloroethane	630206	Ethane, 1,1,1,2-tetrachloro-	1*	4	U208	B	100 (45 4)
,1,2,2-Tetrachloroethane	79345	Ethane, 1,1,2,2-tetrachloro-	1*	2,4	U209	B	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Tetrachloroethane	127184	Ethene, tetrachloro- Perchloroethylene Tetrachloroethylene	1*	2,4	U210	B	100 (45 4)
Tetrachloroethylene	127184	Ethene, tetrachloro- Perchloroethylene Tetrachloroethene	1*	2,4	U210	B	100 (45 4)
2,3,4,6-Tetrachlorophenol	58902	Phenol, 2,3,4,6-tetrachloro-	1*	4	U212	A	10 (4 54)
Tetraethyl lead	78002	Plumbane, tetraethyl-	100	1,4	P110	A	10 (4 54)
Tetraethyl pyrophosphate	107493	Diphosphoric acid, tetraethyl ester	100	1,4	P111	A	10 (4.54)
Tetraethyldithiopyrophosphate	3689245	Thiodiphosphoric acid, tetraethyl ester	1*	4	P109	B	100 (45 4)
Tetrahydrofuran	109999	Furan, tetrahydro-	1*	4	U213	C	1000 (454)
Tetranitromethane	509148	Methane, tetranitro-	1*	4	P112	A	10 (4 54)
Tetraphosphoric acid, hexaethyl ester	757584	Hexaethyl tetraphosphoate	1*	4	P062	B	100 (45.4)
Thallic oxide	1314325	Thallium oxide Tl203	1*	4	P113	B	100 (45 4)
Thallium††	7440280		1*	2		C	1000 (454)
Thallium and compounds	N/A		1*	2			**
Thallium (I) acetate	563688	Acetic acid, thallium (1+) salt	1*	4	U214	B	100 (45.4)
Thallium (I) carbonate	6533739	Carbonic acid, dithallium (1+) salt	1*	4	U215	B	100 (45 4)
Thallium (I) chloride	7791120	Thallium chloride TlCl	1*	4	U216	B	100 (45 4)
Thallium chloride TlCl	7791120	Thallium (I) chloride	1*	4	U216	B	100 (45 4)
Thallium (I) nitrate	10102451	Nitric acid, thallium (1+) salt	1*	4	U217	B	100 (45 4)
Thallium oxide Tl203	1314325	Thallic oxide	1*	4	P113	B	100 (45 4)
Thallium selenite	12039520	Selenious acid, dithallium (1+) salt	1*	4	P114	C	1000 (454)
Thallium (I) sulfate	7446186	Sulfuric acid, dithallium (1+) salt	1000	1,4	P115	B	100 (45 4)
	10031591	•	1000	1,4	P115	B	100 (45 4)
Thioacetamide	62555	Ethanethioamide	1*	4	U218	A	10 (4 54)
Thiodiphosphoric acid, tetraethyl ester	3689245	Tetraethyldithiopyrophosphate	1*	4	P109	B	100 (45.4)
Thiofanox	39196184	2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamino) carbonyl] oxime	1*	4	P045	B	100 (45 4)
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541537	Dithiobiuret	1*	4	P049	B	100 (45 4)
Thiomethanol	74931	Methanethiol Methylmercaptan	100	1,4	U153	B	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
operoxydicarbonic diamide 2N)C(S)] 2S2, tetramethyl-	137268	Thiram	1*	4	U244	A	10 (4.54)
iophenol	108985	Benzenethiol	1*	4	P014	B	100 (45.4)
osemicarbazide	79196	Hydrazinecarbothioamide	1*	4	P116	B	100 (45 4)
iourea	62566		1*	4	U219	A	10 (4 54)
iourea, (2-chlorophenyl)-	5344821	1-(o Chlorophenyl)thiourea	1*	4	P026	B	100 (45 4)
iourea, 1-naphthalenyl-	86884	alpha-Naphthylthiourea	1*	4	P072	B	100 (45 4)
iourea, phenyl-	103855	Phenylthiourea	1*	4	P093	B	100 (45 4)
iram	137268	Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetramethyl-	1*	4	U244	A	10 (4.54)
luene	108883	Benzene, methyl-	1000	1,2,4	U220	C	1000 (454)
luenediamine	95807	Benzenediamine, ar-methyl-	1*	4	U221	A	10 (4 54)
	496720		1*	4	U221	A	10 (4 54)
	823405		1*	4	U221	A	10 (4 54)
	25376458		1*	4	U221	A	10 (4 54)
luene diisocyanate	584849	Benzene, 1,3-diisocyanatomethyl-	1*	4	U223	B	100 (45 4)
	91087		1*	4	U223	B	100 (45 4)
	26471625		1*	4	U223	B	100 (45 4)
Toluidine	95534	Benzenamine, 2-methyl-	1*	4	U328	B	100 (45 4)
Toluidine	106490	Benzenamine, 4-methyl-	1*	4	U353	B	100 (45 4)
Toluidine hydrochloride	636215	Benzenamine, 2-methyl-, hydrochloride	1*	4	U222	B	100 (45 4)
oxaphene	8001352	Camphene, octachloro-	1*	1,2,4	P123	X	1 (0 454)
,4,5-TP acid	93721	Propionic acid 2-(2,4,5-trichlorophenoxy)- Silvex (2,4,5-TP)	100	1,4	U233	B	100 (45 4)
,4,5-TP esters	32534955		100	1		B	100 (45 4)
H-1,2,4-Triazol-3-amine	61825	Amitrole	1*	4	U011	A	10 (4 54)
richlorfon	52686		1000	1		B	100 (45.4)
,2,4-Trichlorobenzene	120821		1*	2		B	100 (45 4)
,1,1-Trichloroethane	71556	Ethane, 1,1,1-trichloro- Methyl chloroform	1*	2,4	U226	C	1000 (454)
,1,2-Trichloroethane	79005	Ethane, 1,1,2-trichloro-	1*	2,4	U227	B	100 (45 4)
richloroethene	79016	Ethene, trichloro- Trichloroethylene	1000	1,2,4	U228	B	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Trichloroethylene	79016	Ethene, trichloro- Trichloroethene	1000	1,2,4	U228	B	100 (45 4)
Trichloromethanesulfenyl chloride	594423	Methanesulfenyl chloride, trichloro-	1*	4	P118	B	100 (45 4)
Trichloromonofluoromethane	75694	Methane, trichlorofluoro-	1*	4	U121	D	5000 (2270)
Trichlorophenol	25167822		10	1		A	10 (4 54)
2,3,4-Trichlorophenol	15950660		10	1		A	10 (4 54)
2,3,5-Trichlorophenol	933788		10	1		A	10 (4 54)
2,3,6-Trichlorophenol	933755		10	1		A	10 (4 54)
2,4,5-Trichlorophenol	95954	Phenol, 2,4,5-trichloro-	10*	1,4	U230	A	10 (4 54)
2,4,6-Trichlorophenol	88062	Phenol, 2,4,6-trichloro-	10*	1,2,4	U231	A	10 (4 54)
3,4,5-Trichlorophenol	609198						
2,4,5-Trichlorophenol	95954	Phenol, 2,4,5-trichloro-	10*	1,4	U230	A	10 (4 54)
2,4,6-Trichlorophenol	88062	Phenol, 2,4,6-trichloro-	10	1,2,4	U231	A	10 (4 54)
Triethanolamine dodecylbenzenesulfonate	27323417		1000	1		C	1000 (454)
Triethylamine	121448		5000	1		D	5000 (2270)
Trimethylamine	75503		1000	1		B	100 (45 4)
1,3,5-Trinitrobenzene	99354	Benzene, 1,3,5-trinitro-	1*	4	U234	A	10 (4 54)
1,3,5-Trioxane, 2,4,6-trimethyl-	123637	Paraldehyde	1*	4	U182	C	1000 (454)
Tris(2,3-dibromopropyl) phosphate	126727	1-Propanol, 2,3-dibromo-, phosphate [(3 1)	1*	4	U235	A	10 (4.54)
Trypan blue	72571	2,7-Naphthalenedisulfonic acid, 3,3'-3,3'-dimethyl-(1,1'-biphenyl)-4,4'-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt	1*	4	U236	A	10 (4 54)
Unlisted Hazardous Wastes Characteristic of Corrosivity	N/A		1*	4	D002	B	100 (45 4)
Unlisted Hazardous Wastes Characteristics. Characteristic of Toxicity	N/A		1*	4			
Arsenic (D004)	N/A		*1	4	D004	X	1 (0 454)
Barium (D005)	N/A		*1	4	D005	C	1000 (454)
Benzene (D018)	N/A		1000	1,2, 3,4	D018	A	10 (4 54)
Cadmium (D006)	N/A		*1	4	D006	A	10 (4 54)
Carbon tetrachloride (D019)	N/A		5000	1,2,4	D019	A	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Cate-gory	Pounds (Kg)
Chlordane (D020)	N/A		1	1,2,4	D020	X	1 (0 454)
Chlorobenzene (D021)	N/A		100	1,2,4	D021	B	100 (45 4)
Chloroform (D022)	N/A		5000	1,2,4	D022	A	10 (4 54)
Chromium (D007)	N/A		*1	4	D007	A	10 (4.54)
o-Cresol (D023)	N/A		1000	1,4	D023	C	1000 (454)
m-Cresol (D024)	N/A		1000	1,4	D024	C	1000 (454)
p-Cresol (D025)	N/A		1000	1,4	D025	C	1000 (454)
Cresol (D026)	N/A		1000	1,4	D026	C	1000 (454)
2,4-D (D016)	N/A		100	1,4	D016	B	100 (45 4)
1,4-Dichlorobenzene (D027)	N/A		100	1,2,4	D027	B	100 (45 4)
1,2-Dichloroethane (D028)	N/A		5000	1,2,4	D028	B	100 (45 4)
1,1-Dichloroethylene (D029)	N/A		5000	1,2,4	D029	B	100 (45 4)
2,4-Dinitrotoluene (D030)	N/A		1000	1,2,4	D030	A	10 (4 54)
Endrin (D012)	N/A		1	1,4	D012	X	1 (0 454)
Heptachlor (and epoxide) (D031)	N/A		1	1,2,4	D031	X	1 (0 454)
Hexachlorobenzene (D032)	N/A		*1	2,4	D032	A	10 (4 54)
Hexachlorobutadiene (D033)	N/A		*1	2,4	D033	X	1 (0 454)
Hexachloroethane (D034)	N/A		*1	2,4	D034	B	100 (45 4)
Lead (D008)	N/A		*1	4	D008		(#)
Lindane (D013)	N/A		1	1,4	D013	X	1 (0 454)
Mercury (D009)	N/A		*1	4	D009	X	1 (0 454)
Methoxychlor (D014)	N/A		1	1,4	D014	X	1 (0 454)
Methyl ethyl ketone (D035)	N/A		*1	4	D035	D	5000 (2270)
Nitrobenzene (D036)	N/A		1000	1,2,4	D036	C	1000 (454)
Pentachlorophenol (D037)	N/A		10	1,2,4	D037	A	10 (4 54)
Pyridine (D038)	N/A		*1	4	D038	C	1000 (454)
Selenium (D010)	N/A		*1	4	D010	A	10 (4 54)
Silver (D011)	N/A		*1	4	D011	X	1 (0 454)
Teterachloroethylene (D039)	N/A		*1	2,4	D039	B	100 (45.4)
Toxaphene (D015)	N/A		1	1,4	D015	X	1 (0 454)
Trichloroethylene (D040)	N/A		1000	1,2,4	D040	B	100 (45 4)
2,4,5-Trichlorophenol (D041)	N/A		10	1,4	D041	A	10 (4.54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
2,4,6-Trichlorophenol (D042)	N/A		10	1,2,4	D042	A	10 (4 54
2,4,5-TP (D017)	N/A		100	1,4	D017	B	100 (45 4
Vinyl chloride (D043)	N/A		*1	2,3,4	D043	X	1 (0.454
Unlisted Hazardous Wastes Characteristic of Ignitability	N/A		1*	4	D001	B	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Reactivity	N/A		1*	4	D003	B	100 (45.4)
Uracil mustard	66751	2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	1*	4	U237	A	10 (4.54)
Uranyl acetate	5411093		5000	1		B	100 (45 4)
Uranyl nitrate	10102064		5000	1		B	100 (45 4)
	36478769					B	
Urea, N ethyl-N-nitroso-	759739	N-Nitroso-N-ethylurea	1*	4	U176	X	1 (0 454)
Urea, N-methyl-N-nitroso	684935	N-Nitroso-N-methylurea	1*	4	U177	X	1 (0 454)
Vanadic acid, ammonium salt	7803556	Ammonium vanadate	1*	4	P119	C	1000 (454)
Vanadium oxide V2O5	1314621	Vanadium pentoxide	1000	1,4	P120	C	1000 (454)
Vanadium pentoxide	1314621	Vanadium oxide V2O5	1000	1,4	P120	C	1000 (454)
Vanadyl sulfate	27774136		1000	1		C	1000 (454)
Vinyl chloride	75014	Ethene, chloro-	1*	2,3,4	U043	X	1 (0 454)
Vinyl acetate	108054	Vinyl acetate monomer	1000	1		D	5000 (2270)
Vinyl acetate monomer	108054	Vinyl acetate	1000	1		D	5000 (2270)
Vinylamine, N methyl-N-nitroso-	4549400	N-Nitrosomethylvinylamine	1*	4	P084	A	10 (4 54)
Vinylidene chloride	75354	Ethene, 1,1-dichloro- 1,1-Dichloroethylene	5000	1,2,4	U078	B	100 (45 4)
Warfarin, & salts, when present at concentrations greater than 0.3%	81812	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations greater than 0 3%	1*	4	P001	B	100 (45.4)
Xylene (mixed)	1330207	Benzene, dimethyl	1000	1,4	U239	C	1000 (454)
m Benzene, dimethyl	108383	m-Xylene	1000	1,4	U239	C	1000 (454)
o-Benzene, dimethyl	95476	o-Xylene	1000	1,4	U239	C	1000 (454)
p-Benzene, dimethyl	106423	p-Xylene	1000	1,4	U239	C	1000 (454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
rlenol	1300716		1000	1		C	1000 (454)
hhimban-16-carboxylic acid, ,17-dimethoxy-18-[(3,4,5-methoxybenzoyl)oxy]-, methyl ter (3beta,16beta,17alpha, beta,20alpha)-	50555	Reserpine	1*	4	U200	D	5000 (2270)
nc††	7440666		1*	2		C	1000 (454)
NC AND COMPOUNDS	N/A		1*	2			**
nc acetate	557346		1000	1		C	1000 (454)
nc ammonium chloride	52628258		5000	1		C	1000 (454)
	14639975		5000	1		C	1000 (454)
	14639986		5000	1		C	1000 (454)
nc borate	1332076		1000	1		C	1000 (454)
nc bromide	7699458		5000	1		C	1000 (454)
nc carbonate	3486359		1000	1		C	1000 (454)
nc chloride	7646857		5000	1		C	1000 (454)
nc cyanide	557211	Zinc cyanide Zn(CN)2	10	1,4	P121	A	10 (4.54)
nc cyanide Zn(CN)2	557211	Zinc cyanide	10	1,4	P121	A	10 (4.54)
nc fluoride	7783495		1000	1		C	1000 (454)
nc formate	557415		1000	1		C	1000 (454)
nc hydrosulfite	7779864		1000	1		C	1000 (454)
nc nitrate	7779886		5000	1		C	1000 (454)
nc phenolsulfonate	127822		5000	1		D	5000 (2270)
nc phosphide	1314847	Zinc phosphide Zn3P2, when present at concentrations greater than 10%	1000	1,4	P122	B	100 (45.4)
nc phosphide Zn3P2, when esent at concentrations greater an 10%	1314847	Zinc phosphide	1000	1,4	P122	B	100 (45 4)
nc silicofluoride	16871719		5000	1		D	5000 (2270)
nc sulfate	7733020		1000	1		C	1000 (454)
rconium nitrate	13746899		5000	1		D	5000 (2270)
rconium potassium fluoride	16923958		5000	1		C	1000 (454)
rconium sulfate	14644612		5000	1		D	5000 (2270)
rconium tetrachloride	10026116		5000	1		D	5000 (2270)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
F001			1*	4	F001	A	10 (4 54)
The following spent halogenated solvents used in degreasing, all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005, and still bottoms from the recovery of these spent solvents and spent solvent mixtures.							
(a) Tetrachloroethylene	127184		1*	2,4	U210	B	100 (45 4)
(b) Trichloroethylene	79016		1000	1,2,4	U228	B	100 (45 4)
(c) Methylene chloride	75092		1*	2,4	U080	C	1000 (454)
(d) 1,1,1-Trichloroethane	71556		1*	2,4	U226	C	1000 (454)
(e) Carbon tetrachloride	56235		5000	1,2,4	U211	A	10 (4 54)
(f) Chlorinated fluorocarbons	N/A					D	5000 (2270)
F002			1*	2,4	F002	A	10 (4 54)
The following spent halogenated solvents; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002,F004, and F005, and still bottoms from the recovery of these spent solvents and spent solvent mixtures.							
(a) Tetracholoroethylene	127184		1*	4	U210	B	100 (45 4)
(b) Methylene chloride	75092		1*	2,4	U080	C	1000 (454)
(c) Trichloroethylene	79016		1000	1,2,4	U228	B	100 (45 4)
(d) 1,1,1-Trichloroethane	71556		1*	2,4	U226	C	1000 (454)
(e) Chlorobenzene	108907		100	1,2,4	U037	B	100 (45 4)
(f) 1,1,2-Trichloro-1,2,2-trifluoroethane	76131					D	5000 (2270)
(g) o-Dischlorobenzene	95501		100	1,2,4	U070	B	100 (45 4)
(h) Trichlorofluoromethane	75694		1*	4	U121	D	5000 (2270)
(i) 1,1,2-Trichloroethane	79005		1*	2,4	U227	B	100 (45 4)
F003			1*	4	F003	B	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
following spent non- genated solvents and the still oms from the recovery of se solvents							
Xylene	1330207					C	1000 (454)
Acetone	67641					D	5000 (2270)
Ethyl acetate	141786					D	5000 (2270)
Ethylbenzene	100414					C	1000 (454)
Ethyl ether	60297					B	100 (45 4)
Methyl isobutyl ketone	108101					D	5000 (2270)
n-Butyl alcohol	71363					D	5000 (2270)
Cyclohexanone	108941					D	5000 (2270)
Methanol	67561					D	5000 (2270)
4			1*	4	F004	C	1000 (454)
following spent non- genated solvents and the still oms from the recovery of se solvents							
Cresols/Cresylic acid	1319773		1000	1,4	U052	C	1000 (454)
Nitrobenzene	98953		1000	1,2,4	U169	C	1000 (454)
5			1*	4	F005	B	100 (45 4)
following spent non- genated solvents and the still oms from the recovery of se solvents							
Toluene	108883		1000	1,2,4	U220	C	1000 (454)
Methyl ethyl ketone	78933		1*	4	U159	D	5000 (2270)
Carbon disulfide	75150		5000	1,4	P022	B	100 (45 4)
Isobutanol	78831		1*	4	U140	D	5000 (2270)
Pyridine	110861		1*	4	U196	C	1000 (454)
06			1*	4	F006	A	10 (4.54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum, (2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbon steel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum							
F007			1*	4	F007	A	10 (4 54)
Spent cyanide plating bath solutions from electroplating operations.							
F008			1*	4	F008	A	10 (4 54)
Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process							
F009			1*	4	F009	A	10 (4.54)
Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process							
F010			1*	4	F010	A	10 (4 54)
Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.							
F011			1*	4	F011	A	10 (4 54)
Spent cyanide solution from salt bath pot cleaning from metal heat treating operations.							
F012			1*	4	F012	A	10 (4 54)
Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process							
F019			1	4	F019	A	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
ewater treatment sludges the chemical conversion ng of aluminum except from nium phosphating in aluminum washing when such phating is an exclusive ersion coating process							
)			1*	4	F020	X	1 (0 454)
tes (except wastewater and it carbon from hydrogen ride purification) from the uction or manufacturing use i reactant, chemical mediate, or component in a ulating process) of tri-or- ichlorophenol, or of mediates used to produce pesticide derivatives (This ig does not include wastes i the production of ichlorophene from highly ied 2,4,5-trichlorophenol)							
1			1*	4	F021	X	1 (0 454)
tes (except wastewater and it carbon from hydrogen ride purification) from the uction or manufacturing use i reactant, chemical mediate, or component in a ulating process) of achlorophenol, or of rmediates used to produce its vatives							
2			1*	4	F022	X	1 (0 454)
stes (except wastewater and nt carbon from hydrogen iride purification) from the ufacturing use (as a reactant, mical intermediate, or iponent in a formulating cess) of tetra-, penta-, or achlorobenzenes under alkaline iditions							
'3			1*	4	F023	X	1 (0 454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-tri-chlorophenol.)							
F024			1*	4	F024	X	1 (0 454)
Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent dessicants(sic), wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in Section 261.32)							
F025			1*	4	F025	X	##1 (0 454)
Condensed light ends, spent filters and filter aids, and spent dessicant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution							

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
26			1*	4	F026	X	1 (0.454)
ıstes (except wastewater and ent carbon from hydrogen loride purification) from the oduction of materials on uipment previously used for the inufacturing use (as a reactant, emical intermediate, or mponent in a formulating ocess) of tetra-, penta-, or xachlorobenzene under alkaline nditions							
27			1*	4	F027	X	1 (0.454)
carded unused formulations ntaining tri-, tetra-, or ntachlorophenol or discarded used formulations containing mpounds derived from these orophenols (This listing does include formulations containing xachlorophene synthesized from ipurified 2,4,5-tri-chlorophenol the sole component.)							
28			1*	4	F028	X	1 (0 454)
sidues resulting from the ineration or thermal treatment soil contaminated with EPA zardous Waste Nos F020, 21, F022, F023, F026, and 27							
32			1*	4	F032	X	1 (0 454)
istewaters, process residuals, servative drippage, and spent mulations from wood preserving icesses generated at plants that rently use or have previously ad chlorophenolic formulations cept wastes from processes it have had the F032 waste de deleted in accordance with 61 35 and do not resume or iate use of chlorophenolic mulations) This listing does include K001 bottom sediment dge from the treatment of istewater from wood preserving icesses that use creosote and/or ntachlorophenol							
34			1*	4	F034	X	1 (0 454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
Wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.							
F035			1*	4	F035	X	1 (0 454)
Wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or penatachlorophenol							
F037			1*	4	F037	X	1 (0 454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
roleum refinery primary water/solids separation sludge-- / sludge generated from the vitational separation of water/solids during the storage reatment of process stewaters and oily cooling stewaters from petroleum neries Such sludges include, are not limited to, those nerated in oil/water/solids parators, tanks and poundments, ditches and other nveyances, sumps, and rmwater units receiving dry ather flow Sludge generated in rmwater units that do not eive dry weather flow, sludges nerated from non-contact once-ough cooling waters segregated treatment from other process oily cooling waters, sludges nerated in aggressive biological atment units as defined in 61.31(b)(2) (including sludges nerated in one or more ditional units after wastewaters ve been treated in aggressive logical treatment units) and 51 wastes are not included in s listing							
38			1*	4	F038	X	1 (0 454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Petroleum refinery secondary (emulsified) oil/water/solids separation sludge--Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from once-through non-contact cooling waters segregated for treatment from other process or oil cooling wastes, sludges and floats generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing							
K001			1*	4	K001	X	1 (0 454)
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.							
K002			1*	4	K002		#
Wastewater treatment sludge from the production of chrome yellow and organge pigments							
K003			1*	4	K003		#
Wastewater treatment sludge from the production of molybdate orange pigments							
K004			1*	4	K004	A	10 (4.54)
Wastewater treatment sludge from the production of zinc yellow pigments.							
K005			1*	4	K005		#

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
tewater treatment sludge from production of chrome green ients							
			1*	4	K006	A	10 (4 54)
tewater treatment sludge from production of chrome oxide n pigments (anhydrous and ated)							
7			1*	4	K007	A	10 (4 54)
tewater treatment sludge from production or iron blue ients							
8			1*	4	K008	A	10 (4.54)
n residue from the production irome oxide green pigments							
9			1*	4	K009	A	10 (4 54)
llation bottoms from the uction of acetaldehyde from lene							
0			1*	4	K010	A	10 (4 54)
llation side cuts from the uction of acetaldehyde from lene							
1			1*	4	K011	A	10 (4.54)
om stream from the tewater stripper inthe uction of acrylonitrile							
3			1*	4	K013	A	10 (4 54)
om stream from the onitrile column in the duction of acrylonitrile							
4			1*	4	K014	D	5000 (2270)
toms from the acetonitrile ication column in the duction of acrylonitrile							
5			1*	4	K015	A	10 (4 54)
bottoms from the distillation benzyl chloride							
6			1*	4	K016	X	1 (0 454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
Heavy ends or distillation residues from the production of carbon tetrachloride							
K017			1*	4	K017	A	10 (4 54)
Heavy ends (still bottoms) from the purification column in the production of epi-chlorohydrin							
K018			1*	4	K018	X	1 (0 454)
Heavy ends from the fractionation column in ethyl chloride production.							
K019			1*	4	K019	X	1 (0 454)
Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.							
K020			1*	4	K020	X	1 (0 454)
Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production.							
K021			1*	4	K021	A	10 (4 54)
Aqueous spent antimony catalyst waste from fluoromethanes production							
K022			1*	4	K022	X	1 (0 454)
Distillation bottom tars from the production of phenol/acetone from cumene							
K023			1*	4	K023	D	5000 (2270)
Distillation light ends from the production of phthalic anhydride from naphthalene							
K024			1*	4	K024	D	5000 (2270)
Distillation bottoms from the production of phthalic anhydride from naphthalene							
K025			1*	4	K025	A	10 (4 54)
Distillation bottoms from the production of nitrobenzene by the nitration of benzene.							
K026			1*	4	K026	C	1000 (454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Cate-gory	Pounds (Kg)
ripping still tails from the oduction of methyl ethyl ridines							
)27			1*	4	K027	A	10 (4.54)
ntrifuge and distillation residues om tolune diisocyanate oduction							
)28			1*	4	K028	X	1 (0.454)
ent catalyst from the drochlorinator reactor in the oduction of 1,1,1- chloroethane							
)29			1*	4	K029	X	1 (0 454)
'aste from the product steam ripper in the production of 1,1,1- chloroethane							
)30			1*	4	K030	X	1 (0 454)
olumn bottoms or heavy ends om the combined production of chloroethylene and rchloroethylene							
)31			1*	4	K031	X	1 (0.454)
/-product salts generated in the oduction of MSMA and icodylic acid							
)32			1*	4	K032	A	10 (4 54)
'astewater treatment sludge from e production of chlordane							
)33			1*	4	K033	A	10 (4.54)
'astewater and scrub water from e chlorination of cyclopentadiene the production of chlordane							
)34			1*	4	K034	A	10 (4 54)
lter solids from the filtration of exachlorocyclo-pentadiene in the roduction of chlordane							
035			1*	4	K035	X	1 (0 454)
/astewater treatment sludges enerated in the production of reosote							
036			1*	4	K036	X	1 (0 454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
Still bottoms from toluene reclamation distillation in the production of disulfoton.							
K037			1*	4	K037	X	1 (0 454)
Wastewater treatment sludges from the production of disulfoton							
K038			1*	4	K038	A	10 (4 54)
Wastewater from the washing and stripping of phorate production							
K039			1*	4	K039	A	10 (4 54)
Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate							
K040			1*	4	K040	A	10 (4 54)
Wastewater treatment sludge from the production of phorate.							
K041			1*	4	K041	X	1 (0 454)
Wastewater treatment sludge from the production of toxaphene.							
K042			1*	4	K042	A	10 (4 54)
Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T							
K043			1*	4	K043	A	10 (4 54)
2,6-Dichlorophenol waste from the production of 2,4-D.							
K044			1*	4	K044	A	10 (4 54)
Wastewater treatment sludges from the manufacturing and processing of explosives							
K045			1*	4	K045	A	10 (4 54)
Spent carbon from the treatment of wastewater containing explosives							
K046			1*	4	K046	B	100 (45 4)
Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds							

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
)47			1*	4	K047	A	10 (4,54)
nk/red water from TNT)erations							
)48			1*	4	K048		#
ssolved air flotation (DAF) float om the petroleum refining dustry							
)49			1*	4	K049		#
op oil emulsion solids from the etroleum refining industry							
)50			1*	4	K050	A	10 (4.54)
eat exchanger bundle cleaning udge from the petroleum refining dustry							
)51			1*	4	K051		#
PI separator sludge from the etroleum refining industry							
)52			1*	4	K052	A	10 (4 54)
ink bottoms (leaded) from the etroleum refining industry							
)60			1*	4	K060	X	1 (0,454)
mmonia still lime sludge coking)erations							
)61			1*	4	K061		#
nission control dust/sludge from e primary production of steel in ectric furnances.							
)62			1*	4	K062		#
)ent pickle liquor generated by eel finishing operations of cilities within the iron and steel dustry (SIC Codes 331 and 332)							
)64			1*	4	K064		##
cid plant blowdown slurry/sludge sulting from thickening of owdown slurry from primary opper production							
)65			1*	4	K065		##

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
Surace impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities							
K066			1*	4	K066		#
Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production							
K069			1*	4	K069		
Emission control dust/sludge from secondary lead smelting							
K071			1*	4	K071	X	1 (0 454
Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.							
K073			1*	4	K073	A	10 (4 54)
Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production							
K083			1*	4	K083	B	100 (45 4)
Distillatin bottoms from aniline extraction							
K084			1*	4	K084	X	1 (0 454)
Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.							
K085			1*	4	K085	A	10 (4 54)
Distillation or fractionation column bottoms from the production of chlorobenzenes.							
K086			1*	4	K086		#

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Cate-gory	Pounds (Kg)
ɔlvent washes and sludges, ıustic washes and sludges, or ater washes and sludges from eaning tubs and equipment used the formulation of ink from gments, driers, soaps, and abilizers containing chromium ıd lead							
ɔ87			1*	4	K087	B	100 (45 4)
ecanter tank tar sludge from ɔking operations							
ɔ88			1*	4	K088		
ɔent potliners from primary uminum reduction							
ɔ90			1*	4	K090		
nission control dust or sludge ɔm ferrochromiumsilicon oduction							
ɔ91			1	4	K091		
nission control dust or sludge ɔm ferrochromium production							
ɔ93			1*	4	K093	D	5000 (2270)
stillation light ends from the oduction of phthalic anhydride ɔm ortho-xylene							
ɔ94			1*	4	K094	D	5000 (2270)
stillation bottoms from the oduction of phthalic anhydride ɔm ortho-xylene							
ɔ95			1*	4	K095	B	100 (45 4)
stillation bottoms from the oduction of 1,1,1- chloroethane							
ɔ96			1*	4	K096	B	100 (45 4)
ɔavy ends from the heavy ends ılumn from the production of 1,1-trichloroethane							
ɔ97			1*	4	K097	X	1 (0 454)
ɔcuum stripper discharge from e chlordane chlorinator in the oduction of chlordane							
ɔ98			1*	4	K098	X	1 (0 454)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
Untreated process wastewater from the production of toxaphene.							
K099			1*	4	K099	A	10 (4 54)
Untreated wastewater from the production of 2,4-D.							
K100			1*	4	K100		#
Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.							
K101			1*	4	K101	X	1 (0 454)
Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.							
K102			1*	4	K102	X	1 (0 454)
Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds							
K103			1*	4	K103	B	100 (45 4)
Process residues from aniline extraction from the production of aniline.							
K104			1*	4	K104	A	10 (4 54)
Combined wastewater streams generated from nitrobenzene/aniline production.							
K105			1*	4	K105	A	10 (4 54)
Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.							
K106			1*	4	K106	X	1 (0 454)
Wastewater treatment sludge from the mercury cell process in chlorine production.							
K107			10	4	K107	X	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA Waste #	Category	Pounds (Kg)
umn bottoms from product ›aration from the production of -dimethylhydrazine (UDMH) m carboxylic acid hydrazines							
›8			10	4	K108	X	10 (4 54)
ndensed column overheads from iduct separation and condensed ctor vent gases from the iduction of 1,1- ıethylhydrazine (UDMH) from boxylic acid hydrazides							
›9			10	4	K109	X	10 (4 54)
ent filter cartridges from product ification from the production of -dimethylhydrazine (UDMH) n carboxylic acid hydrazides							
10			10	4	K110	X	10 (4 54)
ndensed column overheads from ırmediate separation from the duction of 1,1- ıethylhydrazine (UDMH) from boxylic acid hydrazides							
1			1*	4	K111	A	10 (4 54)
duct washwaters from the duction of dinitrotoluene via ation of toluene							
2			1*	4	K112	A	10 (4.54)
ıction by-product water from drying column in the duction of toluenediamine via rogenation of dinitrotoluene							
3			1*	4	K113	A	10 (4.54)
ndensed liquid light ends from purification of toluenediamine he production of ıenediamine via hydrogenation dinitrotoluene							
4			1*	4	K114	A	10 (4.54)
ınals from the purification of ıenediamine in the production oluenediamine via rogenation of dinitrotoluene							
5			1*	4	K115	A	10 (4 54)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.							
K116			1*	4	K116	A	10 (4 54)
Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine							
K117			1*	4	K117	X	1 (0 454)
Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene.							
K118			1*	4	K118	X	1 (0 454)
Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide.							
K123			1*	4	K123	A	10 (4 54)
Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylene bisdithiocarbamic acid and its salts.							
K124			1*	4	K124	A	10 (4 54)
Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts							
K125			1*	4	K125	A	10 (4 54)
Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.							
K126			1*	4	K126	A	10 (4.54)
Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts.							
K131			100	4	K131	X	100 (45 4)

Hazardous Substance	CASRN	Regulatory Synonyms	Statutory RQ	Statutory Code†	Statutory RCRA Waste #	Final RQ Category	Final RQ Pounds (Kg)
/astewater from the reactor and ›ent sulfuric acid from the acid ryer in the production of methyl romide							
132			1000	4	K132	X	1000 (454)
pent absorbent and wastewater olids from the production of ıethyl bromide							
136			1*	4	K136	X	1 (0 454)
till bottoms from the purification ethylene dibromide in the roduction of ethylene dibromide a bromination of ethene							

Indicates the statutory source as defined by 1,2,3, and 4 below
†No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or xceeds 100 micrometers (0 004 inches)
††The RQ for asbestos is limited to friable forms only
--Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA Section 311(b)(4)
--Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA Section 307(a)
--Indicates that the statutory source for designation of this hazardous substance under CERCLA is CAA Section 112
-Indicates that the statutory source for designation of this hazardous substance under CERCLA is RCRA Section 3001.
*--Indicates that the 1-pound RQ is a CERCLA statutory RQ
ndicates that the RQ is subject to change when the assessment of potential carcinogenicity is completed
#The Agency may adjust the statutory RQ for this hazardous substance in a future rulemaking, until then the statutory RQ applies.
--The adjusted RQs for radionuclides may be found in Appendix B to this table
*--Indicates that no RQ is being assigned to the generic or broad class

APPENDIX G

RAIN DATA REFERENCES

Rainfall data sources

This section lists the most current 24-hour rainfall data published by the National Weather Service (NWS) for various parts of the country Because NWS Technical Paper 40 (TP-40) is out of print, the 24-hour rainfall maps for areas east of the 105th meridian are included here as figures B-3 through B-8. For the area generally west of the 105th meridian, TP-40 has been superseded by NOAA Atlas 2, the Precipitation-Frequency Atlas of the Western United States, published by the National Oceanic and Atmospheric Administration.

East of 105th meridian

Hershfield, D M. 1961. Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years U.S Dep Commerce, Weather Bur Tech Pap. No 40 Washington, DC. 115 p.

West of 105th meridian

Miller, J.F , R H Frederick, and R.J Tracey 1973. Precipitation-frequency atlas of the Western United States Vol I, Montana, Vol II, Wyoming, Vol III, Colorado, Vol. IV, New Mexico, Vol V, Idaho, Vol VI, Utah, Vol VII, Nevada, Vol VIII, Arizona, Vol IX, Washington, Vol X, Oregon, Vol. XI, California U.S Dep Commerce, National Weather Service, NOAA Atlas 2. Silver Spring, MD

Alaska

Miller, John F. 1963. Probable maximum precipitation and rainfall-frequency data for Alaska for areas to 400 square miles, durations to 24 hours and return periods from 1 to 100 years U.S. Dep Commerce, Weather Bur Tech Pap No 47 Washington, DC. 69 p

Hawaii

Weather Bureau. 1962 Rainfall-frequency atlas of the Hawaiian Islands for areas to 200 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dep. Commerce, Weather Bur. Tech Pap. No 43 Washington, DC. 60 p.

Puerto Rico and Virgin Islands

Weather Bureau. 1961. Generalized estimates of probable maximum precipitation and rainfall-frequency data for Puerto Rico and Virgin Islands for areas to 400 square miles, durations to 24 hours, and return periods from 1 to 100 years. U.S. Dep. Commerce, Weather Bur. Tech. Pap. No. 42. Washington, DC. 94 p.

Source Urban Hydrology for Small Watersheds (TR55 Manual) - U S Department of Agriculture, Soil Conservation Service, June 1986

APPENDIX H

THE POLLUTANT REMOVAL CAPACITY OF POND AND WETLAND SYSTEMS: A REVIEW

THE POLLUTANT REMOVAL CAPACITY OF POND AND WETLAND SYSTEMS: A REVIEW

			No. of Storms	Watershed Area (Acres)	Treatment Vol. (In./Acre)	TSS	TP	SP	TN	NO3	COD	Pb	Zn
Dry Extended Detention													
1	Lakendge	VA	28	88.0	0 00	0 to 20%	20 to 40%	Insufficient Knowledge	0 to 20%	0 to 20%	Insufficient Knowledge	Insufficient Knowledge	Insufficient Knowledge
2	London Commons	VA	27	11.4	0.22	20 to 40%	40 to 60%	Insufficient Knowledge	20 to 40%	Insufficient Knowledge	0 to 20%	20 to 40%	20 to 40%
						60 to 80%	40 to 60%	Insufficient Knowledge	60 to 80%	Insufficient Knowledge	40 to 60%	20 to 40%	20 to 40%
3	Stedwick	MD	25	34.0	0.30	60 to 80%	0 to 20%	Insufficient Knowledge	20 to 40%	Insufficient Knowledge	20 to 40%	60 to 80%	40 to 60%
4	Maple Run III	TX	17	28.0	0.50	20 to 40%	0 to 20%	Insufficient Knowledge	20 to 40%	40 to 60%	20 to 40%	20 to 40%	Insufficient Knowledge
5	Oakhampton	MD	16.8		0 50*	60 to 80%	20 to 40%	Insufficient Knowledge	Insufficient Knowledge	Insufficient Knowledge	Insufficient Knowledge	Insufficient Knowledge	Insufficient Knowledge
6	None Given	KS	19	12.3	3.42	0 to 20%	0 to 20%	0 to 20%	Insufficient Knowledge	0 to 20%	0 to 20%	60 to 80%	60 to 80%
Wet Ponds													
7	Seattle	WA	5	0.75		80 to 100%	40 to 60%	Insufficient Knowledge	Insufficient Knowledge	Insufficient Knowledge	60 to 80%	60 to 80%	60 to 80%
8	Boynton Beach	FL	8			80 to 100%	Insufficient Knowledge	60 to 80%	Insufficient Knowledge	80 to 100%	Insufficient Knowledge	Insufficient Knowledge	Insufficient Knowledge
9	Grace Street	MI	18		** 0 52	20 to 40%	0 to 20%	Insufficient Knowledge	0 to 20%	Insufficient Knowledge	Insufficient Knowledge	20 to 40%	Insufficient Knowledge
10	Pitt-AA	MI	6	4872.0	** 0.52	20 to 40%	0 to 20%	Insufficient Knowledge	Insufficient Knowledge	0 to 20%	20 to 40%	60 to 80%	0 to 20%
11	UnquaNY		8		**10 70	40 to 60%	40 to 60%	Insufficient Knowledge	Insufficient Knowledge	Insufficient Knowledge	Insufficient Knowledge	60 to 80%	Insufficient Knowledge
12	Waverly Hills	MI	29		** 7.57	80 to 100%	40 to 60%	Insufficient Knowledge	60 to 80%	60 to 80%	60 to 80%	80 to 100%	80 to 100%
13	Lake Ellyn	IL	23		**10 70	80 to 100%	20 to 40%	Insufficient Knowledge	60 to 80%	60 to 80%	Insufficient Knowledge	60 to 80%	60 to 80%
14	Lake Ridge	MN	20	315.0	0.08	80 to 100%	40 to 60%	0 to 20%	40 to 60%	0 to 20%	Insufficient Knowledge	60 to 80%	Insufficient Knowledge
						80 to 100%	20 to 40%	0 to 20%	20 to 40%	0 to 20%	Insufficient Knowledge	40 to 60%	Insufficient Knowledge
15	West Pond	MN	3	76.0	0 15	60 to 80%	20 to 40%	Insufficient Knowledge	Insufficient Knowledge	80 to 100%	Insufficient Knowledge	40 to 60%	60 to 80%

Key
- 0 to 20% Removal
- 20 to 40% Removal
- 40 to 60% Removal
- 60 to 80% Removal
- 80 to 100% Removal
- Insufficient Knowledge

Key
- TSS Total Suspended Solids
- TP Total Phosphorus
- SP Soluble Phosphorus
- TN Total Nitrogen
- N03 Nitrate
- COD Chemical Oxygen Demand
- P6 Lead
- Zn Zinc

Note: An Asterisk (*) denotes an inferred value
Note (**)Denotes Volume of Basin/Volume of Runoff

Note The table above provides summary data on the pollutant removal capability of nearly sixty stormwater pond and wetland systems Each study differs with respect to pond design, number of storms monitored, pollutant removal calculation technique, and monitoring technique, so exact comparisons between studies are not appropriate

Note: The Information in the above table was taken from: A Current Assessment of Urban Best Management Practices - Techniques for Reducing Non-Point Source Pollution in the Coastal Zone, prepared by Metropolitan Washington Council of Governments, March 1992.

THE POLLUTANT REMOVAL CAPACITY OF POND AND WETLAND SYSTEMS: A REVIEW

Wet Ponds (Cont'd)			No of Storms	Watershed Area (Acres)	Treatment Vol (In/Acre)	TSS	TP	SP	TN	NO3	COD	Pb	Zn
16	McCarrons	MN	21	608 0	0 19	●	◕	⊗	●	⊗	●	●	⊗
17	McKnight Basin	MN	20	725 0	0 22	●	◑	○	◔	◔	⊗	◕	⊗
						●	◔	○	○	○	⊗	◕	⊗
18	Monroe Street	WI		238 0	0 26	●	◕	◕	⊗	⊗	◕	◕	◕
19	Runaway Bay	NC	5	437.0	0 33	◑	◔	⊗	⊗	⊗	⊗	⊗	◑
20	Buckland	CT	7	20 0	0 40	◕	◑	⊗	⊗	◔	⊗	◔	◑
21	Highway Site	FL	13	41 6	0 55	◕	○	⊗	◔	⊗	○	◑	◔
22	Woodhollow	TX	14	381.0	0 55	◑	◑	⊗	◔	◑	◑	◕	◕
23	SR 204	WA	5	1.8	0 60	●	●	⊗	⊗	⊗	◕	●	●
24	Farm Pond	VA		51 4	1.13	●	●	◕	◔	⊗	⊗	⊗	⊗
25	Burke	VA	29	27.1	1.22	⊗	◔	◕	◔	⊗	◔	●	◔
26	Westleigh	MD	32	48 0	1.27	●	◑	◕	◔	⊗	◔	●	◔
27	Mercer	WA	5	7 6	1 72	◕	◕	⊗	⊗	⊗	◕	◔	◔
28	I-4	FL	6	26 3	2 35	◑	◕	⊗	⊗	●	⊗	◕	◕
29	Timber Creek	FL	9	122.0	3 11*	◕	◑	●	○	◕	⊗	⊗	⊗
30	Maitland	FL	30-40	49 0	3 65	⊗	⊗	●	⊗	●	⊗	●	●
31	Lakeside	NC	5	65 0	7 16	●	◔	⊗	⊗	⊗	⊗	⊗	●

Key:

○ 0 to 20% Removal
◔ 20 to 40% Removal
◑ 40 to 60% Removal
◕ 60 to 80% Removal
● 80 to 100% Removal
⊗ Insufficient Knowledge

Key

TSS Total Suspended Solids
TP Total Phosphorus
SP Soluble Phosphorus
TN Total Nitrogen
N03 Nitrate
COD Chemical Oxygen Demar
P6 Lead
Zn Zinc

Note An Asterisk (*) denotes an inferred value
Note (**)Denotes Volume of Basin/Volume of Runoff

Note: *The information in the above table was taken from A Current Assessment of Urban Best Management Practices - Techniques for Reducing Non-Point Source Pollution in the Coastal Zone, prepared by Metropolitan Washington Council of Governments, March 1992.*

THE POLLUTANT REMOVAL CAPACITY OF POND AND WETLAND SYSTEMS: A REVIEW

			No. of Storms	Watershed Area (Acres)	Treatment Vol. (In./Acre)	TSS	TP	SP	TN	NO3	COD	Pb	Zn
Wet Extended Detention													
32	Uplands	ONT	5	860 0		●	◕	⊗	⊗	⊗	⊗	⊗	⊗
33	East Barrhaven	ONT		2139 0	0 12	◑	◔	⊗	⊗	⊗	⊗	⊗	⊗
34	Kennedy-Burnett	ONT	6	395 0	0 62	●	◕	⊗	◑	⊗	⊗	◔	◔
Stormwater Wetlands													
35	EWA3	IL				◕	◑	⊗	⊗	◕	⊗	⊗	◔
36	EWA4	IL				◕	◑	⊗	⊗	◑	⊗	⊗	⊗
37	EWA5	IL				●	◕	⊗	⊗	◕	⊗	⊗	⊗
38	EWA6	IL				●	●	⊗	⊗	●	⊗	⊗	⊗
39	B31	WA	13	461 7	0 01	○	⊗	⊗	⊗	○	⊗	⊗	⊗
40	PC12	WA	13	214 0	0 03	◑	⊗	⊗	⊗	◔	⊗	⊗	⊗
41	McCarrons	MN	21	608 0	0 31	◕	◔	⊗	◔	⊗	◕	◕	⊗
42	Queen Anne's	MD			0.50*	◕	◔	◑	◔	◑	⊗	⊗	⊗
43	Swift Run	MI	5	1207 0	0 60	●	○	◔	⊗	◕	○	●	⊗
44	Tampa Office Pond	FL	3-8	6.3	0 61	◕	◑	◕	⊗	◕	○	●	⊗
45	Highway Site	FL	13	41 6	0.81	◕	○	⊗	◔	⊗	○	◕	◑
46	Palm Beach PGA	FL		2340.0	2 00*	◑	◑	⊗	⊗	◔	⊗	⊗	⊗

Key
- ○ 0 to 20% Removal
- ◔ 20 to 40% Removal
- ◑ 40 to 60% Removal
- ◕ 60 to 80% Removal
- ● 80 to 100% Removal
- ⊗ Insufficient Knowledge

Key:
- TSS Total Suspended Solids
- TP Total Phosphorus
- SP Soluble Phosphorus
- TN Total Nitrogen
- N03 Nitrate
- COD Chemical Oxygen Demand
- P6 Lead
- Zn Zinc

Note An Asterisk (*) denotes an inferred value
Note (**)Denotes Volume of Basin/Volume of Runoff

Note The information in the above table was taken from· A Current Assessment of Urban Best Management Practices - Techniques for Reducing Non-Point Source Pollution in the Coastal Zone, prepared by: Metropolitan Washington Council of Governments, March 1992

THE POLLUTANT REMOVAL CAPACITY OF POND AND WETLAND SYSTEMS: A REVIEW

			No. of Storms	Watershed Area (Acres)	Treatment Vol. (In./Acre)	TSS	TP	SP	TN	NO3	COD	Pb	Zn
Extented Detention Wetlands													
47	Benjamin Franklin	VA		40.0	0 08	◕	○	◔	⊗	◑	⊗	⊗	⊗
48	Tanners's Lake	MN	10	413 0	0 10	◕	◔	○	◔	◔	⊗	◕	⊗
						◕	○	⊗	○	○	⊗	◑	⊗
49	Mays Chapel	MD		97.0	0 10*	◔	○	◔	⊗	◔	⊗	⊗	⊗
50	Clear Lake	MN		1070 0	0.15*	◕	◑	◔	⊗	⊗	⊗	⊗	⊗
Natural Wetlands													
51	Hidden Lake	FL		55 4	1.08*	●	○	⊗	⊗	◕	⊗	◑	◔
52	Wayzata	MN		73 0	1.25*	●	◕	⊗	⊗	⊗	⊗	●	◕
Pond/Wetland Systems													
53	Lake Munson	FL	3	23393 0		●	◕	⊗	○	○	◔	◑	◑
						◑	◔	◔	○	○	⊗	◑	⊗
54	Carver Ravine	MN	15	170.0	0 30*	◔	○	○	⊗	○	⊗	○	⊗
						●	◕	⊗	●	⊗	●	●	⊗
55	McCarrons	MN	21	608 0	>0 50	●	●	⊗	◕	◕	⊗	⊗	⊗
56	Lake Jackson	FL		2230 0	0 88*	●	◔	⊗	◑	⊗	⊗	●	◕
57	Highway Site	FL	13	41 6	>1.35	●	●	⊗	⊗	⊗	⊗	⊗	⊗
58	Long Lake	ME	11	18 0	2.0*								

Key:

○ 0 to 20% Removal
◔ 20 to 40% Removal
◑ 40 to 60% Removal
◕ 60 to 80% Removal
● 80 to 100% Removal
⊗ Insufficient Knowledge

Key

TSS Total Suspended Solids
TP Total Phosphorus
SP Soluble Phosphorus
TN Total Nitrogen
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Note An Asterisk (*) denotes an inferred value
Note (**)Denotes Volume of Basin/Volume of Runoff

Note: The information in the above table was taken from' A Current Assessment of Urban Best Management Practices - Techniques for Reducing Non-Point Source Pollution in the Coastal Zone, prepared by Metropolitan Washington Council of Governments, March 1992.

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Office of Wastewater Enforcement & Compliance
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STORM WATER MANAGEMENT FOR CONSTRUCTION ACTIVITIES- DEVELOPING POLLUTION PREVENTION PLANS AND BEST MANAGEMENT PRACTICES

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