CHAPTER 7

TABLE OF CONTENTS

7.00 POLLUTION PREVENTION

DESCRIPTION

Individuals, industries and local government should develop and implement a Pollution Prevention Plan (Plan), which could be part of a local water-management plan, to address the specific conditions for various sites, facilities or activities. The goal of the Plan is to avoid, minimize or mitigate pollution. If pollutants cannot be eliminated**,** they should be properly treated or removed for disposal.

ENVIRONMENTAL CONCERNS

Storm water is an environmental concern because, depending upon its source and its path, it can contain or pick up contaminants which are then transferred to the surface or ground water to which it drains. Certain contaminants can degrade the quality of the surface water so much that the health of plants and animals within and surrounding the water body are affected. For this reason, the 1987 amendments to the Clean Water Act required the U.S. Environmental Protection Agency (EPA) to develop regulations for stormwater discharges associated with municipal and industrial activity.

PLANNING CONSIDERATIONS

The EPA regulations require some stormwater discharges to be authorized under a National Pollutant Discharge Elimination System (NPDES) permit. In 1992, the EPA delegated authority to the Minnesota Pollution Control Agency (MPCA) to administer the storm water NPDES program.

The MPCA currently regulates the stormwater runoff from a variety of activities, including construction activities, municipal separate storm sewer systems (MS4s) in populated areas and certain industrial stormwater discharges. Phase I of the NPDES stormwater program already covers large and medium MS4s, 10 industrial categories and construction activity that disturbs five or more acres. The final Storm Water Phase II rule, signed on October 29, 1999, and published in the *Federal Register* on December 8, 1999 (63 FR 1536), expanded the NPDES program to cover all small MS4s within urbanized areas as well as construction sites that disturb one to five acres. Cities may also be required to obtain permits for some industrial, construction and other activities. Contact the MPCA for the latest requirements.

IMPLEMENTATION

Most management of stormwater runoff can be accomplished through the use of best management practices (BMPs), which, for the purposes of this manual, have been classified in two groups: nonstructural and structural.

Nonstructural BMPs focus on changing behavior and management. These measures can be described as “good common sense” and can include such practices as moving materials inside to reduce exposure, prohibiting certain practices, training, and employing spill-prevention plans.

Table 7.00-1

Mandatory Facilities

Mining, Oil & Gas Operations

1011	1041	1081	1221	1231	1311	1382	1411	1442	1474	1481
1021	1044	1094	1222	1241	1321	1389	1422	1446	1475	1499
1031	1061	1099			1381		1423	1455	1479	
							1429	1459		

Manufacturing

2411	2449	2812	2843	2891	3111	3261	3281	3313	3339	3365
2421	2451	2813	2844	2892		3262	3291	3315	3341	3366
2426	2452	2816	2851	2893	3211	3263	3292	3316	3351	3369
2429	2491	2819	2861	2895	3221	3264	3295	3317	3353	3398
2431	2493	2821	2865	2899	3229	3269	3296	3321	3354	3399
2435	2499	2822	2869	2911	3241	3271	3297	3322	3355	
2436		2823	2873	2951	3251	3272	3299	3324	3356	3441
2439	2611	2824	2874	2952	3253	3273		3325	3357	
2441	2621	2841	2875	2992	3255	3274	3312	3331	3363	3731
2448	2631	2842	2879	2999	3259	3275		3334	3364	3732

Automobile Recycling

5015	5093

Discretionary Facilities

Manufacturing

2011	2079	2281	2394	2678	3087	3452	3542	3592	3676	3827
2013	2082	2282	2395	2679	3088	3462	3543	3593	3677	3829
2015	2083	2284	2396		3089	3463	3544	3594	3678	3841
2021	2084	2295	2397	2711		3465	3545	3596	3679	3842
2022	2085	2296	2399	2721	3131	3466	3546	3599	3691	3843
2023	2086	2297		2731	3142	3469	3547		3692	3844
2024	2087	2298	2434	2732	3143	3471	3548	3612	3694	3845
2026	2091	2299		2741	3144	3479	3549	3613	3695	3851
2032	2092		2511	2752	3149	3482	3552	3621	3699	3861
2033	2095	2311	2512	2754	3151	3483	3553	3624		3873
2034	2096	2321	2514	2759	3161	3484	3554	3625	3711	
2035	2097	2322	2515	2761	3171	3489	3555	3629	3713	3911
2037	2098	2323	2517	2771	3172	3491	3556	3631	3714	3914
2038	2099	2325	2519	2782	3199	3492	3559	3632	3715	3915
2041		2326	2521	2789		3493	3561	3633	3716	3931
2043	2111	2329	2522	2791	3231	3494	3562	3634	3721	3942
2044	2121	2331	2531	2796		3495	3563	3635	3724	3944
2045	2131	2335	2541		3411	3496	3564	3639	3728	3949
2046	2141	2337	2542	2833	3412	3497	3565	3641	3743	3951
2047		2339	2591	2834	3421	3498	3566	3643	3751	3952
2048	2211	2341	2599	2835	3423	3499	3567	3644	3761	3953
2051	2221	2342		2836	3425		3568	3645	3764	3955
2052	2231	2353	2652		3429	3511	3569	3646	3769	3961
2053	2241	2361	2653	3011	3431	3519	3571	3647	3792	3965
2061	2251	2369	2655	3021	3432	3523	3572	3648	3795	3991
2062	2252	2371	2656	3052	3433	3524	3575	3651	3799	3993
2063	2253	2381	2657	3061	3442	3531	3577	3652		3996
2064	2254	2384	2671	3069	3443	3532	3578	3661	3812	3999
2066	2257	2385	2672	3081	3444	3533	3579	3663	3821	
2067	2258	2386	2673	3082	3446	3534	3581	3669	3822	
2068	2259	2387	2674	3083	3448	3535	3582	3671	3823	
2074	2261	2389	2675	3084	3449	3536	3585	3672	3824	
2075	2262	2391	2676	3085	3451	3537	3586	3674	3825	
2076	2269	2392	2677	3086		3541	3589	3675	3826	
2077	2273	2393								

Transportation and Warehousing

4011	4111	4141	4212	4221	4231	4412	4481	4492	4512	5171
4013	4119	4142	4213	4222		4424	4482	4493	4513	
	4121	4151	4214	4225	4311	4432	4489	4499	4522	
	4131	4173	4215	4226		4449	4491		4581	

Structural BMPs are measures that control or manage stormwater runoff and drainage. Examples of structural BMPs include enclosures used for covering exposed significant materials, swales, dikes or stormwater-treatment basins.

One of the highest priorities of stormwater regulations and BMPs is to improve the quality of surface waters by reducing or eliminating the contact of pollutants with storm water. Whenever significant materials are exposed to storm water, there is a potential for the pollutant stormwater runoff to degrade water quality. Significant materials can be any type of raw or finished items that are stored, handled, used, processed or generated at a site. (For a description of significant materials, see page 20 of the general permit for industrial activities, available from the MPCA.)

Previous regulations required certain industries to obtain permits on a mandatory or discretionary basis based on Standard Industrial Codes (SICs). See Table 7.00-1 for a list of mandatory and discretionary facilities. The Phase II rule conditionally exempts industrial facilities in all 10 categories that have "no exposure" of significant materials to storm water, thereby reducing application of the program to many industrial activities that had been previously required to get permits.

FOR MORE INFORMATION

The MPCA also has many regulatory and pollution-prevention programs that can affect storm water, such as the hazardous waste program, the above-ground and underground tanks programs, spills-response programs and even air quality rules. This manual cannot be all-inclusive. This chapter presents pollution-prevention principles and examples of how these issues can be handled. Many fact sheets have been developed to help individuals, industries and local governments to develop their pollution-prevention programs. Contact the MPCA for information related to your specific program.

The MPCA has fact sheets and staff to answer your questions about the programs affecting stormwater runoff, including the stormwater permit program for industrial activity, construction activities and municipalities. Hazardous waste, tanks or other programs also have significant resources and information available that may be applicable. For more information on how these programs may be helpful for your facilities, contact the MPCA office closest to your county (see Table 7.00-2).

Table 7.00-2 MPCA offices and phone numbers

Toll-free (all MPCA offices)	(800) 657-3864
Brainerd	(218) 828-2492
Detroit Lakes	(218) 847-1519
Duluth	(218) 723-4660
Marshall	(507) 537-7146
Rochester	(507) 285-7343
St. Paul	(651) 296-6300
Willmar	(320) 214-3791
MPCA web site: http://www.pca.state.mn.us	

7.01 Nonstructural Practices: PLAN DEVELOPMENT

When preparing a Stormwater Pollution Prevention Plan and making recommendations for BMPs, the following factors should be taken into account: implementability, cost effectiveness, and contaminant/pollutant removal effectiveness.

The Plan will only be valuable if it is effective, workable and affordable (*i.e.*, if it can and will be implemented).

The steps involved in the development of the plan, as well as the interaction between various phases, should be carefully spelled out. For example, observations made during the monitoring phase may indicate it is necessary to reconduct the site reconnaissance for a specific activity or material or to re-evaluate the BMPs originally selected. This "continuous loop" evaluation process will improve the Plan concepts and implementation

PLANNING AND ORGANIZATION

The planning and organization phase starts with designating a person to lay out the organization of the Plan. For larger projects or complex issues, the individual may want to form a pollution prevention team to research existing conditions, gather maps and drawings, develop procedures for spill and response plans, or gather materials safety data sheets and other documents that will be used to assist in preparing and implementing the Plan.

The Plan must specify roles and responsibility for the individual or each team member. Each responsibility indicated in the Plan must have an individual assigned to manage it. Whether required by Minnesota's general stormwater permit regulations or not, the permit conditions can be a guide to development of a pollution-prevention plan.

A simple way to organize the pollution prevention team is to work from duty to responsible person. First, list all the responsibilities. Next, assign a title/position that is compatible with the responsibility. Then assign an individual to manage each task. Link the assignments to skills and abilities. This procedure will identify the pollution prevention team members and their respective responsibilities. All team members should have a title associated with their positions. The responsibility/title correlation makes it easier to re-assign team members as employees are promoted or leave the organization. The responsibilities assigned to a title can be used to define job descriptions for new employees.

Team responsibilities/tasks that should be assigned to titles/individuals include (if applicable):

- storm water manager (individual or director of the team),
- owner's representative,
- individual to perform detailed site reconnaissance/assessment,
- personnel to maintain material inventory and to evaluate handling and storage practices,
- maintenance supervisor,
- director of housekeeping practices (litter control, lawn management and erosion control),

- fueling facility manager,
- de-icing practices manager,
- manager/coordinator of aerial spraying operations,
- spill/release coordinator,
- training/education program director,
- secretary for documentation of meetings and records, and
- Water quality monitoring coordinator.

The pollution prevention team will meet as often as required (daily, monthly, quarterly, semiannually or otherwise) to review the plan, discuss plan-implementation results and make revisions, as required, to meet the plan's goals and objectives. Discussions, meeting notes and revisions must be documented in stormwater-management files.

The following are general requirements of a plan:

1. Complete a drainage map. The map should indicate the following items at or adjacent to the facility:
   a. drainage areas and directions of runoff (indicated by arrows);
   b. discharge outfalls from the site (structures, such as ditches or storm sewers, that carry runoff from the facility);
   c. the name and location of waters of the state that receive facility runoff (If waters of the state are too distant from the facility to be indicated on the site map, indicate the name, direction and shortest distance to the lake, river, stream or wetland that receives runoff from your site.);
   d. areas where materials or waste produces (which may include solid waste or air emissions) are exposed;
   e. locations of storm sewer inlets and an indication of which, if any, structures have floor drains or loading dock drains that are connected to storm sewers;
   f. locations and types of BMPs currently installed at the facility to reduce or eliminate pollutants; and
   g. location of water quality monitoring point(s), if needed.

2. Complete an inventory of exposed materials. Indicate the types of materials handled or stored at the site. The following are examples of materials that, if exposed, must be included in the inventory:
   a. raw materials, such as fuels, solvents, petroleum products, detergents, plastic pellets, materials used in food processing or production, stockpiled sand, salt or coal;
   b. by-products or intermediate products, such as wood dust, chips or bark, screened limestone, taconite or gravel by-product, recycled blacktop;
   c. finished materials, such as metallic products, including scrap metal and recycled or scrap motor vehicle parts, old process equipment/machinery, taconite pellets;
   d. waste products, such as ashes, sludge, solid and liquid waste, slag;
   e. hazardous substances designated under section 101(14) of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA);

f. any chemical the facility is required to report under section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA).

3. Evaluate facility areas for exposure of materials. In creating the inventory of exposed materials, the person or team developing the plan must, at a minimum, evaluate the following areas at the industrial site (as well as other areas where appropriate) to determine whether or not materials are exposed in these areas:
   a. vehicle and equipment maintenance, parking and storage areas, including fueling and washing/cleaning areas, to determine whether there is discolored soil in these areas as a result of fuel or lubricant leaks or spills;
   b. liquid storage tanks and other bulk material stockpile areas;
   c. loading and unloading areas;
   d. outdoor manufacturing, processing or storage areas and industrial plant yards, to determine whether there is discolored soil in these areas as a result of leaked or spilled solvents, fuels or lubricants;
   e. dust- or particulate-generating areas, including dust-collection devices that may release dust;
   f. rooftops contaminated by industrial activity or operation of a pollution-control device;
   g. on-site waste disposal areas, such as waste ponds, dumpsters, solid waste storage or management areas; and
   h. exposed (nonvegetated) soil areas where there is a potential for erosion to occur.

4. Describe appropriate BMPs, including structural and nonstructural BMPs, that will be used at the facility to minimize, eliminate or control pollution at the site. The description must include an objective for each BMP, as well as a description of how to evaluate proper functioning of the BMP and any maintenance requirements of the BMP. BMPs should target materials and areas identified in the site plan. The following general categories of BMPs shall be considered and one or more shall be incorporated into the facility's Plan if materials are exposed to storm water on site:
   a. Source reduction: Reduce or eliminate the materials that are exposed. Materials-management practices should be evaluated to determine whether inventories of exposed materials can be reduced or eliminated. This can include cleanup of old equipment yards, periodic checking of dust-control equipment to ensure there is no accumulation of dust in the area around the control equipment, removal and treatment of petroleum-contaminated soil, consolidation of materials from many areas into one area, and training employees regarding proper handling and disposal of materials. Materials may also be moved indoors or covered with a tarp or structure to eliminate contact with precipitation.
   b. Diversion: Divert drainage away from exposed materials through the use of curbing, berms, sewers or other forms of drainage control or elevate exposed material above surrounding drainage.
   c. Treatment: Where contact of materials is unavoidable, use treatment devices to reduce the concentration and amount of pollutants in the discharge. Such devices include oil/water separators, detention/retention ponds and vegetated swales.

5. Evaluate all discharge conveyances from the site (storm sewers, pipes, tile lines, ditches, etc.) to determine whether liquids other than uncontaminated storm water are being discharged from

these devices. This should be done during dry weather when stormwater discharge is not occurring. The evaluation should cover sewer inlets and floor drains to determine which inlets/drains are connected to sanitary sewer lines, storm sewer lines, or septic tanks/drainage fields. Appropriate methods, such as dye or smoke testing or video imaging, should be used to determine the source of discharges. The Plan must certify that discharges from the site have been evaluated for the presence of non-stormwater discharges. The certification shall indicate the date of testing, location of testing, the methods used to determine the source of discharges and the results of testing. Discharge of non-storm water (such as sanitary sewer or floor drain connections to storm sewers) is *not* authorized. Before such discharge may continue, authorization under an appropriate NPDES permit must be obtained.

6. Develop a preventive maintenance program. The program must require regular inspection and maintenance of management devices (*e.g.*, cleaning oil/water separators and catch basins), as well as inspecting and testing plant equipment and systems to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants (*e.g.*, hydraulic leaks, torn baghouse filters) to surface waters.

7. Develop a spill-prevention-and-response procedure. In order to develop this procedure, the person or team developing the Plan should evaluate where spills have occurred and where they have the potential to occur. Determine drainage points for potential spill areas and develop appropriate spill-prevention-and-containment measures. Detailed procedures for cleaning up spills shall be identified and made available to appropriate personnel. If the facility has any other spill contingency plan that satisfies the above requirements, that plan may be incorporated by reference into this Plan to satisfy this requirement.

8. Develop and implement an employee training program to inform appropriate personnel of the components and goals of the Plan. Training shall address spill response, good housekeeping and materials-management practices. The Plan shall identify periodic dates for such training.

9. Identify personnel responsible for managing and implementing the Plan as well as those responsible for the reporting requirements of the permit. This should include the facility contact person as indicated on the permit application. Identified personnel must be available at reasonable times of operation.

Table 7.01-1 indicates recommended BMPs that would eliminate, reduce contact, or would treat pollutants with potential to discharge. Other appropriate methods that will eliminate or reduce contact or treat pollutants are acceptable. Facilities must collect and dispose of wastes in accordance with appropriate federal, state and local requirements.

See - Minnesota General Storm Water Permit, Industrial Activity (page 8 of 20).

Table 7.01-1

Material, Area, or Activity	**Synopsis of Recommended BMPs to Reduce or Eliminate Contact or Treat Runoff**
Storage Areas/Stockpiled Materials (for Materials Including Raw, Intermediate and Finished Product)	• See Section 7.50 and following • Cover and/or enclose stored materials to prevent contact. • Divert around storage areas. • Stack/pile material to minimize surface area exposed to precipitation. • Practice good housekeeping measures such as frequent removal of debris. • Install treatment measures to remove pollutants from runoff prior to **discharge** from the site.
Waste Storage Areas	• See Section 7.21 • Minimize waste generated at the site. • Store indoors or in covered dumpsters or under other types of cover. • Divert around areas. • Install treatment devices to remove pollutants from runoff prior to **discharge** from the site.
Loading/Unloading and Other Material Handling Areas	• See Section 7.44 • Cover loading and unloading areas. • Divert around areas. • Where dust is likely to be generated during material handling, install equipment or change methods of handling to minimize or eliminate dust generation. • If liquid materials are being loaded or unloaded and if loading/unloading areas drain to storm sewer inlets, prevent material from getting into the storm sewer inlets. • Install treatment measures to remove pollutants from runoff prior to **discharge** from the site.
Outdoor Storage Tanks or Drums of Fuel, Lubricants, Solvents.	• See section 7.60 and following • Store drums inside (if allowed by Fire Marshall or insurer). • Prepare and train appropriate employees in dealing with spills and leaks properly, use dry clean-up methods when possible. • Install impervious surface underneath drums. • Prevent run-on to and runoff from tank and drum storage areas, provide adequate containment to hold spills and leaks.

Table 7.01-1 *(cont.)*

Obsolete Equipment Stored Outside	• See section 7.43 • When possible, dispose of unused equipment properly, or move indoors. • Drain and recycle fluids from equipment. • Cover equipment. • Divert around equipment.
Floor, Sink, or Process Wastewater Connected to a Storm Sewer	• See Section 7.30 and following • Inspect and test floor, sink and process wastewater drains for proper connections and remove any connections to storm sewers or **waters of the state**.
Exterior Vehicle and Equipment Washing	• See Section 7.42 • Conduct washing indoors or in a covered area. • Contain and recycle wash waters. • **Discharge** wash waters to sanitary sewer with permission of the receiving wastewater treatment authority. • Do not allow off-site **discharge** of wastewater. • Evaluate wastewater from steam cleaning of parts contaminated with oils, greases or solvents that is not recycled to determine if it is hazardous. Dispose of hazardous sludge and wastewater appropriately.
Fueling Areas	• See Section 7.44 • Minimize run-on into the fueling area. • Use dry clean-up methods for fuel area rather than hosing down the fuel area. • Train appropriate employees on proper fueling practices. • Install treatment devices to remove pollutants from runoff before it discharges from the site.
Vehicle and Equipment Dismantling and Maintenance	• Promptly transfer used fluids to the proper closed container for recycling; empty drip pans when they fill.
Spills of Liquid Material	• See Section 7.22 • Stop the source of the spill immediately. • Contain the liquid until cleanup is complete. • Deploy oil containment booms if the spill may reach waters of the state or drainageways to waters of the state. • Cover the spill with absorbent material. • Dispose of cleanup materials properly. • Report the spill to the Duty Officer, when appropriate.

Table 7.01-1 *(cont.)*

Areas of the Facility with Unstabilized Soils Subject to Erosion.	• See Chapter 6.00 and following • Minimize run-on from adjacent areas. • Seed and mulch or sod low traffic areas. • Stabilize high traffic areas including vehicle entrances, exits, loading, unloading and vehicle storage areas. • Prevent sediment from unstabilized areas from leaving the site. • Install treatment devices to remove pollutants from the runoff prior to **discharge** from the site.
Surface Preparation, Paint Removal and Paint Spraying	• See Section 7.45 • Enclose, cover, or contain blasting, sanding, and spray painting activities to the extent practical. • Collect spent abrasives routinely and store under a cover to await proper disposal. Evaluate spent abrasives and removed paint to determine if it is hazardous. Test waste material for lead content and dispose of waste material properly.

7.02 Nonstructural Practices: EMPLOYEE TRAINING

Successful waste-reduction activities need support from all employees, including top management and production personnel.

Less waste is generated if employees are trained to operate equipment and handle materials safely and correctly. Occupational and safety hazards are reduced as well.

ISSUES

Employees should be made aware of the costs and environmental issues related to hazardous waste generation and disposal. One way to do this is to post these costs and any waste-reduction savings on bulletin boards throughout the company.

Waste reduction usually happens in production processes. Explain how waste is generated by each process so employees understand that they share the responsibility for waste generation. Employees that are well informed can make valuable waste-reduction suggestions.

Incentive programs can be useful in encouraging employees to participate in waste-reduction activities.

IMPLEMENTATION

Employees should be trained to look for practices which:

- generate less waste by making existing processes more efficient.
- are common-sense measures that apply to the human side of business rather than to the technological side; therefore, they can be used in all areas of production.
- are easy and inexpensive to implement, and practical for your operations.
- have health and safety benefits for employees, the general public and the environment.

Good operating practices include:

- improved inventory management;
- waste segregation;
- improved production scheduling;
- preventive maintenance;
- spill and leak prevention;
- employee training and education;
- employee participation in planning;
- materials usage, handling and storage; and
- clear labeling.

7.03 Nonstructural Practices: INSPECTIONS AND MAINTENANCE

1. Site inspections should be conducted at least once every two months by an appropriately trained person. The purpose of these inspections is to (1) determine whether structural and nonstructural BMPs require maintenance or changes, and (2) to evaluate the completeness and accuracy of the Plan. Inspections should be documented using an inspection form provided by the owner. The following compliance items should be inspected, and documented where appropriate:
   a. Evaluate the facility to determine that the Plan accurately reflects site conditions as described in Part II.A. of the permit, documenting any inaccuracies;
   b. evaluate the facility to determine whether new exposed materials have been added to the site since completion of the Plan, documenting any new materials;
   c. during the inspection conducted during the runoff event, observe the runoff to determine whether it is discolored or otherwise visibly contaminated, documenting observations; and
   d. determine whether the nonstructural and structural BMPs as indicated in the Plan are installed and functioning properly in accordance with the implementation schedule.

2. On the inspection form, indicate the date and time of the inspection as well as the name of the inspector.

3. If conditions are observed at the site that require changes in the Plan, the changes should be made as soon as possible

4. If the findings of a site inspection indicate that BMPs are not meeting the objectives, corrective actions must be initiated within 30 days and the BMP restored to full operation as soon as field conditions allow.

RECORDS

A copy of the Plan should be retained on the site, and be available upon request. The following records should be maintained:

- dates of inspections;
- findings of inspections;
- corrective actions taken;
- documentation of all changes to the Plan; and
- a copy of annual reports.

NOTIFICATION

If a spill, bypass or release occurs, it must be reported to the appropriate authority. The spill plan must specify who shall report and where the report shall be made.

7.04 Nonstructural Practices: MONITORING AND EVALUATION

The monitoring phase involves conducting periodic site observations, stormwater characterization and voluntary stormwater sampling and analytical data. Based on the results of the monitoring program, the effectiveness of the BMPs can be evaluated. If necessary, more appropriate BMPs may be implemented to replace existing practices. Appropriate revisions should be made to the Plan to document BMP changes.

ROUTINE SITE OBSERVATIONS

A site reconnaissance must be performed at least once every two months with at least one performed after a significant storm event (generally any event that produces runoff, but at least as stated in the Minnesota general storm water permit regulations). See page 11 of Part II - Minnesota General Storm Water Industrial Permit.

EVALUATION AND UPDATE

The Plan is required to be updated when changes occur in physical site conditions, on-site operations, material-handling and -storage methods or other characteristics or activities. In addition to the changes, the observer must clearly document the results of the implemented BMPs and the condition of the structural BMPs.

Stormwater runoff observations made during a rainfall event and collection of stormwater samples for visual characterization is very useful in determining effectiveness of BMPs. One method for collecting stormwater samples for visual characterization is jar sampling. By dipping a clear glass jar into the stormwater outfall (*i.e.*, ditch, culvert, etc.), the observer can obtain samples of stormwater discharge. (**Safety note:** All jar sample collections should be performed from the ground surface. Do not enter manholes or catch basins to observe stormwater conditions or to collect samples. If necessary, the jar may be taped to a pole to obtain flows from storm sewer pipes). Stormwater observation results should be documented.

The first 10 to 20 minutes of an intense storm event are commonly known as “first flush” conditions. Sampling of this portion of the storm is critical. The first flush represents the high concentration of pollutants due to the buildup that has occurred on the surface areas since the last rainfall event. Additional jar samples should be taken at regular intervals (20 or 30 minutes) during the storm event. The jars should be allowed to sit a while to allow sediment to accumulate at the bottom of the jar. Some indicators of water quality are color, odor, oil sheen and sediment. The visual observation of storm water allows for qualitative description of storm water quality. For quantitative data, stormwater sampling and laboratory analysis are the only effective methods.

ANNUAL REPORTS

For permitted sites, the MPCA will send copies of a fill-in-the-blank annual report to the facility each year during the first week of January. Reports must be submitted to the MPCA no later than March 31 and may be sent as early as January 1 of each year. The facility's first annual report will cover the time period since the facility received coverage through December 31 of the reporting year. Subsequent annual reports will cover the calendar year January 1 through December 31. Information required in the annual report includes:

- a brief summary of the pollution prevention plan,
- list of any spills that occurred during the reporting period and corrective actions taken,
- description of inspections, and
- description of implemented structural and nonstructural BMPs.

If you are not required to submit a report, the process or a similar process may be helpful in evaluating the effectiveness of your Plan.

7.20 GENERAL PRACTICES

Pollution-prevention practices include good housekeeping/site maintenance BMPs, such as litter pick-up, lawn-management practices, sweeping, erosion control and maintenance of stormwater-conveyance systems. These practices usually take a minimal amount of effort compared to cleanup efforts, and should be part of the routines of businesses, personnel and users.

7.21 General Practices: WASTE-HANDLING AND WASTE-STORAGE AREAS

MANAGING SOLID WASTE

Litter not only ruins the beauty of Minnesota's waters and the environment, it can also injure and kill aquatic life. Encourage people to collect their trash and return it to proper disposal facilities by providing solid waste disposal service as part of normal practice. Post signs to encourage disposal of wastes in the proper waste containers. Separate waste streams, such as recycled water and solid waste.

HAZARDOUS WASTES

If storing hazardous wastes, mark each container with the words "Hazardous Waste" and the date you first placed waste in the container.

Examples:

- Hazardous Waste, Waste Paint Thinner 04-24-1999
- Hazardous Waste, Sanding/Blasting Waste 05-17-1999

Store the container on an impermeable surface. Coated concrete is a good choice. Coated asphalt is also acceptable. Uncoated asphalt is unacceptable for storing solvents, such as gasoline or paint thinners, because the solvents will dissolve the asphalt.

Seal any floor drains in the storage area to prevent spills from escaping. Provide storage devices to contain spills. Acceptable methods include curbs or cover, or covered spill pallets. Secure the area from access by unauthorized persons. If you are storing ignitable wastes, such as paint thinners or other solvents, outdoors, protect them from heat to prevent expansion and explosion; if water-based, such as latex, protect from freezing to prevent container expansion and possible leaks.

Metal or polyethylene drums should be used as appropriate for the type of wastes being stored. Keep the container closed unless adding or removing waste. Mark each container with a clear description of the contents.

Examples:

- Used Oil
- Waste Antifreeze
- Spent Absorbent Materials

Lead-Acid Batteries

Facilities that accept or store lead-acid batteries for recycling must store them on an impermeable surface, such as coated concrete or asphalt. If stored outdoors, the surface must also be curbed to contain leaks and covered to prevent snow and rain from entering. In many cases, covered pallets or secondary cases made of durable and chemical-resistant materials are a better option than curb and cover. Send spent batteries with a battery hauler for recycling. For more information on battery storage, request MPCA fact sheet #4.06, *Managing Spent Lead-Acid Batteries.*

MORE TIPS TO HELP YOU PREVENT POLLUTION

- Inspect parts, such as rubber fuel lines, regularly; replace before they break.
- Use cleaners only when absolutely necessary.
- When changing oil, wipe up spills immediately and catch all used oil in a container for recycling.
- Drain old antifreeze and other recyclable materials into a container for recycling.
- If using a boom or pillow to remove oil, replace it periodically and place it with other oil-soaked sorbents destined to be burned for energy recovery.

7.22 General Practices: SPILL PLANS

DESCRIPTION

Some facilities may already have a Spill Prevention Control and Countermeasures (SPCC) Plan which addresses the proper handling and storage of materials and the availability of equipment needed to prevent or respond to a spill. The Pollution Prevention Plan should incorporate parts of the SPCC and other management plans located at a site. If you witness a spill, call the Minnesota Duty Officer at (800) 422-0798 or (651) 649-5451.

PREVENTING SPILLS

- Do regular preventive maintenance on tanks and fuel lines.
- Train employees in proper management of hazardous materials, hazardous wastes and tanks.
- In facility leases, include a clause that allows employees to enter and conduct emergency measures.
- Keep hazardous product and waste containers closed when not in use.
- Do not fill gasoline tanks to the very top.
- Post signs or provide information on spill prevention and clean-up methods to patrons.

RESPONDING TO SPILLS

Even with the best care and training, accidental spills will happen. Be prepared to contain and clean them up as quickly as possible.

If a spill happens:

1. Contain the spill.
2. Call the Minnesota Duty Officer at (800) 422-0798 or (651) 649-5451.
3. Clean up the spill.

Stop the source of the spill immediately. Contain the liquid until cleanup is complete. Deploy oil-containment booms if the spill may reach waters of the state or drainageways to waters of the state. Cover the spill with absorbent material. Dispose of cleanup materials properly. Report the spill to the Minnesota Department of Public Safety Duty Officer (call 800/422-0798 or 651/649-5451) when there is a release of a reportable quantity (five gallons or more for petroleum spills). Spills of all other chemicals or materials of any quantity may be reportable. If in doubt, report, or contact the MPCA.

7.23 General Practices: LITTER CONTROL

DESCRIPTION AND PURPOSE

Litter can include scraps of paper, building materials, construction wastes, industrial scraps, leaves, grass clippings and other trash. Litter control involves the removal of litter from streets and other surfaces before runoff or wind moves these materials to surface waters.

PLANNING CONSIDERATIONS

A recycling program and/or proper disposal of waste will help reduce the volume of waste generated and assist in minimizing pollution.

Educational programs that explain the environmental benefits of litter control and leaf collection are helpful.

Ordinances, especially those that prevent debris and litter at construction and industrial sites, can be particularly useful and effective.

Maintaining a clean, litter-free facility includes street sweeping and picking up of debris and garbage on a regular basis or as necessary. Trash containers should be available and of adequate size. Containers should be covered to prevent wind from blowing their contents out and rain water from entering the container. It is best to locate trash containers a significant distance from the nearest storm sewer inlet.

Ultimate disposal of trash should be to an approved disposal or recycling facility.

7.24 General Practices: LAWN MANAGEMENT

DESCRIPTION

Improper lawn-management programs can result in release of pollutants, such as fertilizers, herbicides and eroded soil, into runoff waters. In addition, excessive use of fertilizers and pesticides is an expense that produces no benefit to the facility. On the other hand, inadequate fertilization can result in poor vegetative cover, which may result in soil erosion.

CONSIDERATIONS

Lawn-management BMPs involve proper fertilization, mowing, watering, and pesticide-application procedures. Applying fertilizers only at the rates necessary to maintain lawn areas will minimize potential pollution from lawns. Using the proper fertilizer composition, appropriate application rates, and avoiding spreading fertilizers on impervious surfaces will also minimize the potential runoff into the storm sewer system.

Significant nutrient loads can result from overapplication of lawn fertilizer in urban areas. Fertilizer management can be an effective practice. It involves controlling the type, rate, timing and method of fertilizer application in urban areas so that plant nutrient needs are met while the chance of polluting surface or ground water is minimized. Specifically, this practice is directed at control of phosphorus and nitrogen in runoff from landscaped areas. Nitrogen is of special concern because of potential ground water contamination from nitrates.

Phosphorus is a major water quality concern because it is a primary cause of lake enrichment leading to excessive growth of aquatic plants and algae. Although misuse or misapplication of phosphorus fertilizer can cause water-quality problems, it may be needed initially to establish a healthy stand of vegetative cover. Phosphorus is essential to seedling germination and growth. If a seeding fails or is sparse because of a phosphorus deficiency, the resulting erosion can cause sediment pollution, which carries a large nutrient load with it. In this case, the proper use of phosphorus fertilizer can actually reduce long-term nonpoint-source pollution. In new seedings, phosphorus fertilizer should be incorporated into the soil during seedbed preparation. The soil should then be protected with appropriate erosion-control practices.

Existing lawns should be aerated with a coring machine before the fertilizer is applied. Phosphorus fertilizer recommendations should be based upon a soil test. In some areas of Minnesota, soils are naturally high in phosphorus and other areas may have high levels because of a build-up from previous fertilizer applications. In these cases, fertilizers that do not contain phosphorus should be used.

Nitrogen is the fertilizer element that generally brings about the greatest response in plants. It is found in soils in the ammonium form, the nitrate form and as a component of soil organic matter. In all but very wet or dry soils, the ammonium form is readily converted to the nitrate form. This nitrate form is completely soluble and is not held tightly by soil particles. Therefore, nitrate can readily leach downward and contaminate ground water. Ground water contamination is most likely

when excess nitrogen fertilizer is applied on highly permeable sandy soils. Because of the mobility of nitrate in most soils, nitrogen soil tests are not generally used for making nitrogen fertilizer recommendations in Minnesota. Nitrogen fertilizer guidelines for lawns and gardens follow:

- To avoid nitrogen loss on sandy soils, apply fertilizer at one-half the recommended rate but twice as often. Another option to avoid nitrogen loss on sandy soils is the use of slow-release nitrogen fertilizers or natural organic nitrogen sources. Applying no more than the recommended rate of nitrogen fertilizer will minimize the chance of ground-water-pollution problems.
- Leaving grass clippings on turf areas will provide nutrients to the soils and reduce the amount of fertilizer required to maintain the lawn. When mowing lawns or raking leaves, do not pile clippings or leaves in the street or on an impervious surface. Leaves should be composted.
- Overwatering lawns may result in soil, fertilizers pesticides or herbicides being washed off the lawn surface and discharged into the storm sewer conveyance system.

BMPs FOR FERTILIZER APPLICATION AND LANDSCAPE MAINTENANCE

- Have the soil tested and follow soil test recommendations. In some areas, city governments have passed ordinances regulating fertilizer use on lawns. Homeowners should be aware of any local regulations before applying fertilizer.
- For more information on calculating fertilizer rates and methods of fertilizer application, contact the University of Minnesota Extension Service.
- Water your lawn after fertilizing, but do not allow water to run off into streets or other direct conduits to water bodies.
- Promptly clean up any fertilizer spilled on roads or sidewalks.
- Never apply fertilizer to frozen ground.
- Do not deposit fertilizer in the water or onto street or sewer systems that discharge directly to water.

7.25 General Practices: DUST CONTROL

DESCRIPTION

Dust from smokestacks and vents as well as from stockpiles, cleared ground and open areas, often called "fugitive dust," is a form of air pollution. The surface and air movement of dust from disturbed surfaces may cause off-site damage, health hazards and traffic problems. Industries and local governments sometimes use various methods to control this dust. Filters and scrubbers are often used on regulated discharges, so this BMP is directed more toward fugitive dust, which may or may not be regulated by permit. Construction activities that disturb soil also can be a significant source of fugitive dust; large quantities of dust can be generated, especially in "heavy" construction activities, such as land grading for road construction and commercial, industrial or subdivision development.

This BMP also emphasizes some of the water-quality issues you should consider when using dust-control treatments on construction sites, roads, industrial sites and other disturbed areas, so that your air pollution solution doesn't turn into water pollution. For general guidance on road maintenance and water pollution control, consult the September 1992 EPA publication, *Rural Roads: Pollution Prevention and Control Measures (F15),* available by calling the Terrene Institute at (800) 726-4853.

Industry-specific measures can vary widely, depending on the products and the physical properties of the materials used. Industrial associations are often a good source of information regarding pollution prevention. Flexibility is important because concerns regarding dust control need to address site-specific needs and changing circumstances.

PLANNING CONSIDERATIONS

- The greatest dust problems occur when the probability of rainfall erosion is lowest. Therefore, do not expose large areas of soil, especially during drought conditions. Maintain dust control measures through dry weather periods until all disturbed areas have been stabilized.
- Schedule construction operations so that the least area is disturbed at one time.
- Leave undisturbed buffer areas between graded areas wherever possible.
- Install temporary or permanent surface-stabilization measures immediately after completing land grading.
- For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see: Surface Stabilization*).*
- When properly applied, mulch (including gravel mulch) offers a fast, effective means of controlling dust. Stone used to stabilize construction roads can also be effective for dust control.
- Use measures, such as roofs, tarps or other covers, and progressing to filters and scrubbers or surface treatments to minimize impacts.
- Deep plow large, open disturbed areas and bring clods to the surface. Tillage is a temporary emergency measure that can be used as soon as soil blowing starts. Begin plowing on the windward edge of the site.

- A board fence, wind fence, sediment fence or similar barrier can control air currents and blowing soil. Place barriers perpendicular to prevailing air currents at intervals about 15 times the barrier height. Where dust is a known problem, preserve windbreak vegetation.
- Reduce speed limits on roads that generate substantial dust.
- Pave roads that generate substantial dust.
- Use management practices which prevent problems first. Improved handling measures or reduced stockpiles are some of the measures that prevent dust creation.
- Know the exact chemical content, aquatic toxicity and human health effects of any dust-control material. Be sure to obtain this information from vendors before purchasing a chemical product.
- Be careful not to apply liquid materials so that they pond or run off the application area.
- Do not apply chemicals close to bridges, culvert crossings, ditches, streams, wetlands or other surface waters.
- Do not apply chemicals that may run off when it is raining, when it may rain soon, or if the surface is frozen.
- Do not apply chemicals near wells or where they can easily contaminate ground water.

PRODUCT-SPECIFIC ISSUES

Water should not be overapplied and any runoff should be controlled. The site may be sprinkled until the surface is wet. Sprinkling is especially effective for dust control on haul roads and other traffic routes. This method can be costly and must be performed during dry periods.

Used oil is prohibited by the MPCA for dust control in part due to the possible presence of contamination products in the oil and water pollution concerns from oil in the runoff.

Oil emulsions and resins (bitumens) contain hydrocarbons that can adversely impact aquatic life and drinking water.

Polyacrylamides pose some concerns for drinking and ground water.

Soybean soapstock contains vegetable oils, and is generally less likely to cause water-quality impacts than other dust-control products.

Lignosulfonates can harm vegetation and seedling growth. There are also potential water-pollution impacts due to oxygen depletion of water, acidity, corrosivity, ammonia, phenols, sulfate, zinc and other heavy metals, all of which can be potential water quality concerns. Therefore, lignosulfonates require more care in application than most other chemical stabilizers.

Salts can harm vegetation and may cause water-quality problems if used in high concentrations or in sensitive areas. Salt 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. Salts may contain high levels of lead, mercury or other metals, and anti-caking substances, such as cyanates. Oilfield brines also may contain petroleum hydrocarbon pollutants.

7.26 General Practices: EROSION AND SEDIMENT CONTROL

This management practice is covered in detail in chapter 6. Refer to that chapter for further details.

Most of the erosion- and sediment-control practices have been directed toward construction and agricultural practices. These same practices can be applied to existing erosion concerns at other sites. There is much documentation and information available on erosion and sediment control. BMPs for erosion/sediment control for construction activities are available from the USDA's Natural Resources Conservation Service (NRCS), MPCA, Minnesota Board of Water and Soil Resources, and county soil and water conservation districts. The Metropolitan Council and other local units of government may also be contacted for additional information.

Sediment has the ability to bind with other contaminants and transport them downstream. Controlling sedimentation is accomplished by minimizing clearing and grading, by establishing vegetative cover on soils and/or reducing stormwater runoff velocities by flattening slopes and/or installing flow-dispersion methods.

SEDIMENT- AND EROSION-PREVENTION PRACTICES

Any site where soils are exposed to water, wind or ice can have soil erosion and sedimentation problems. Erosion is a process in which soil and rock material is loosened and removed. Sedimentation occurs when soil particles suspended in surface runoff or wind 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 cannot 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.

Plans must be developed for areas that may have a high potential for soil erosion. This includes areas with such heavy activity that plants cannot grow, such as soil stockpiles, stream banks, steep slopes, construction areas, demolition areas and any area where the soil is disturbed, denuded (stripped of plants) and subject to wind and water erosion. Steps to limit this erosion must be implemented as needed.

There are several ways to limit and control sediment and erosion on a site:

- Leave as much vegetation on the site as possible.
- Minimize the time that soil is exposed.
- Prevent runoff from flowing across disturbed areas (divert the flow to vegetated areas).

- Stabilize disturbed soils as soon as possible.
- Slow the runoff flowing across the site.
- Provide drainageways for the increased runoff (use grassy swales rather than concrete drains).
- Remove sediment from stormwater runoff before it leaves the site.

Using these measures to control erosion and sedimentation is an important part of stormwater management. Selecting the best set of sediment- and erosion-prevention measures for your industry depends upon the nature of the activities on your site (*i.e.*, how much construction or land disturbance there is) and other site-specific conditions (soil type, topography, climate and season). Section 4.51 discusses temporary and permanent ways to stabilize your site. Chapters 4 and 5 of this manual describe more structural ways to control sediment and erosion.

In arid regions, growing vegetation to prevent erosion may be difficult. The local NRCS office or county extension office can provide information on special measures necessary to promote the establishment of vegetation.

VEGETATIVE-PRESERVATION PRACTICES

Preserving existing vegetation or revegetating disturbed soil as soon as possible after construction is the most effective way to control erosion. A vegetative cover reduces erosion potential in four ways:

1. by shielding the soil surface from 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, shrubs, bark, mulch or straw. Grasses are the most common types of cover used for revegetation because they grow quickly, providing erosion protection within days. Other soil-stabilization materials, such as straw or mulch, may be used during nongrowing seasons to prevent erosion. Newly planted shrubs and trees establish root systems more slowly, so preserving existing vegetation is a more effective practice.

Vegetative preservation and other site-stabilization practices can be either temporary or permanent. Temporary controls provide a cover for exposed or disturbed areas for short periods or until permanent erosion controls are put in place. Permanent vegetative preservation practices are used when activities that disturb the soil are completed or when erosion is occurring on a site that has been otherwise stabilized. This manual describes other common vegetative preservation practices including:

- preservation of natural vegetation;
- buffer zones;
- stream bank stabilization;
- mulching, matting and netting;
- temporary seeding;

- permanent seeding and planting;
- sodding; and
- chemical stabilization.

7.27 General Practices: STREET SWEEPING

DESCRIPTION AND PURPOSE

Street sweepings are materials, such as sand, salt, leaves and debris that are swept from city streets, parking lots and sidewalks to prevent them from being washed into storm sewers and surface waters, and to improve the appearance of public roadways. If these materials are removed from the streets where they are deposited, they will not be in urban runoff. In most cases, the prime reason for street sweeping is for aesthetics and urban housekeeping rather than for water-quality benefits. Streets are normally swept with either a mechanical broom sweeper or a vacuum sweeper.

The timing of sweeping is important. For example, the most beneficial sweeping is accomplished early in the spring after snow melt; after activities that generate debris, such as construction entrances, the unloading and loading of salt, sand and gravel or other materials; and throughout the year as needed based on observation and traffic volumes.

When loading or unloading salt, sand, gravel or other granular materials, sweep the loading/unloading areas at the end of each day, as well as along the paths that the trucks use. Sweep in a pattern that keeps spilled material from being pushed towards the catch basin inlets. Locate storage and disposal sites for the material collected during sweeping so it will not get back to the storm sewer systems.

TARGET POLLUTANTS

Street sweeping is most effective for removing coarse particles, leaves, trash and other, similar materials. In some cases, there could be a relatively high delivery ratio for these materials to storm water if they are not removed from street surfaces. The pollutants generally reduced by street sweeping include sediment, nutrients and oxygen-demanding substances. Although streets may be swept at other times for aesthetic reasons, routine street sweeping is recommended as a BMP in Minnesota at only two times during the year—immediately following spring snowmelt to remove sand and other debris, and in the fall to remove accumulated debris, such as leaves that have fallen. Loading or unloading and tracking of mud onto paved surfaces from construction sites could require sweeping at any time of the year.

PLANNING CONSIDERATIONS

A semiannual street sweeping program is recommended to remove debris after spring snowmelt and after leaves fall in the autumn.

Two types of street sweepers are commonly used: vacuum sweepers and mechanical broom sweepers. Vacuum sweepers are more effective for removing fine particles, which is important because many pollutants are adsorbed to them. However, vacuum sweepers have the disadvantage of being ineffective at cleaning wet street surfaces.

Broom sweepers are effective at picking up large particulate matter and cleaning wet street surfaces. They also cost less to operate than vacuum sweepers. Broom sweepers generally create airborne dust during their operation, which increases atmospheric loading.

Street sweepings do not include potentially contaminated materials removed from spill sites, hazardous waste cleanup sites or other contaminated areas. Materials from these sources, whether or not they are removed by a sweeping process, must be tested to determine whether they are hazardous. If they are, they must be managed according to hazardous waste requirements. If you are working at a spill or cleanup site, contact the MPCA coordinator assigned to that site for more information.

Reuse of Sweepings

Before to reusing sweepings, trash, leaves and other debris should be removed from them. This is often accomplished by screening, but other methods may also be used. Dispose of trash and debris removed from the sweepings by recycling it (*e.g.*, aluminum cans), composting it (*e.g.*, leaves) or sending it to a sanitary landfill.

If you store sweepings prior to reusing them, cover the sweepings with a plastic tarp or other covering to prevent erosion.

Street sweepings can often be successfully reused in any of the following ways:

- Mix street sweepings with new salt/sand mixture for winter application to roads, parking lots or sidewalks. When screening sweepings for reuse in this way, use a small mesh for the final screening to ensure that all of the larger debris has been removed. (A 3/4-inch mesh will screen out much of the debris.)
- Use street sweepings as daily cover material on landfills. When reusing sweepings as a cover material, the MPCA recommends using them only on sanitary or demolition landfills that have ground water monitoring systems.
- Removed sediments should be handled in accordance with part 7.28, Sediment Handling.

In most cases, these residuals are not “hazardous waste.” However, the material is contaminated well beyond levels associated with the raw storm water itself, with a wide array of inorganic and organic pollutants. Disposal without proper precautions would not be recommended regardless of the source of the residue.

For More Information

A report titled *Best Practices: Street Sweepings*, which provides information on efficient and economical ways to conduct sweeping operations, is available from the Metropolitan Council. To request a copy, call (651) 291-6359.

7.28 General Practices: STORMWATER SEDIMENT HANDLING

DESCRIPTION

Controlling stormwater and snowmelt runoff is a pollution-control activity undertaken by cities, counties and private firms. Proper removal, transport and disposal of the sediments produced through this activity are important parts of the project. This part is intended to provide guidance on disposal practices for sediments from construction activities, publicly owned stormwater ponds and stormwater system grit chambers.

By following these guidelines carefully and completely, you can ensure that your project is protecting the environment.

GENERAL GUIDELINES FOR DISPOSAL

Stormwater sediments removed from publicly owned systems generally do not meet the criteria of "hazardous waste." However, these sediments are contaminated with a wide array of organic and inorganic pollutants well beyond the levels of these pollutants in the raw storm water itself. Regardless of the source of these residual wastes from stormwater treatment, disposal without proper precautions is not recommended.

Stormwater sediments should never be disposed in water or allowed to erode into waters, including wetlands. Rainwater and snowmelt should be diverted around and away from the removed sediments. This will prevent the liquid from carrying sediment back into a waterway.

SEDIMENTS NOT COVERED UNDER THESE GUIDELINES

The disposal guidelines in this manual do not apply to sediments specifically permitted under the National Pollutant Discharge Elimination System (NPDES), the State Disposal System (SDS) program, or other pollution control programs.

This means that sanitary sewer or combined sewer clean-outs or sludges should not be disposed under these guidelines, but may have specific requirements placed on them by those programs. Sediments from temporary ponds constructed under the stormwater general permit for construction activities can normally be disposed of in accordance with these guidelines.

Because some industrial sites may pose a greater environmental risk, sediments from industrial stormwater ponds located on private property and other the industrial stormwater treatment are ***not*** covered under these guidelines. To dispose of industrial pond sediments or sanitary sewer system wastes, you must assess the waste to determine appropriate disposal. Call the MPCA at (800) 657-3864 for more information.

Higher contaminant levels typically will occur when the area through which the storm water drains is the site of a major spill or an ongoing hazardous waste cleanup. When sediments are associated with such situations, these guidelines for disposal ***do not*** apply. In these cases, the sediments must be tested and handled appropriately, based on the testing. Contact the MPCA's cleanup coordinator for the specific spill or cleanup project (1-800-657-3864).

Municipal stormwater runoff is typically contaminated with heavy metals, petroleum hydrocarbons, pesticides and many types of organic chemicals. These guidelines ***do not*** apply to dredge spoil materials removed from permanent stormwater ponds, lakes, rivers and wetlands unless they have been determined to be exempt from MPCA State Disposal System Permit requirements. For these dredging projects, you may need to obtain a general or individual permit from the MPCA. Contact the MPCA at (800) 657-3864 for more information on dredging projects.

DISPOSAL IDEAS AND SUGGESTED LOCATIONS

In some areas of Minnesota, materials are needed for use as daily cover on landfills. Dewatered stormwater sediments may be used as daily cover material, although the MPCA prefers that they be used as cover on lined areas of permitted sanitary landfills or demolition landfills that have ground-water-monitoring systems. Individual counties may have additional restrictions. Contact the county's solid waste officer for more information.

When exempt from other permit requirements, upland areas can be used for sediment disposal, but precautions are necessary. Areas to be especially avoided for the storage or disposal of stormwater sediments include playgrounds, children's play areas and residential yards, or other areas where human contact with the sediments would occur. Also, because sediments usually have a fine texture, they should not be used in areas that may be used in the future for on-site sewage treatment systems.

In most cases, these residuals are not "hazardous waste." However, the material is contaminated well beyond levels associated with the raw storm water itself, with a wide array of inorganic and organic pollutants. Disposal without proper precautions would not be recommended regardless of the source of the residue.

TIPS FOR REMOVAL AND TRANSPORTATION OF SEDIMENTS

Sediments from ponds, lakes, rivers, streams, harbors or other waters must be carefully removed to minimize turbidity, further sedimentation, or other adverse water-quality impacts. Careful transportation of sediments to the disposal site is essential to prevent spills:

1. Sediments should be transported by motor vehicle only after they are dewatered.
2. Hydraulically transported sediments should go only to a secure disposal facility designed to hold the entire volume of sediment and the transport water.
3. In general, supernatant, underdrains or wash waters are prohibited from being discharged to water bodies, except in unusual circumstances or after getting a permit. The MPCA recommends that these waters be evaporated, recycled or discharged to a sanitary sewer system, with the approval of the wastewater-treatment operator.
4. Should a spill occur during transportation, cleanup of the spilled material should be started as soon as possible. The spilled material should be cleaned up to the maximum extent practical.

MORE INFORMATION

For more information on disposal of sediments, contact the MPCA at (800) 657-3864 or (651) 296-6300.

7.30 SYSTEM STRUCTURE

This section covers practices that apply to the maintenance of the stormwater system.

7.31 System Structure: CATCH BASIN SUMPS

DESCRIPTION AND PURPOSE

Catch basins are chambers installed in a storm sewer, which allow surface runoff to enter the sewer. Many catch basins have a low area called a "sump," which is intended to retain sediment. By trapping coarse sediment, the catch basin prevents solids from clogging the storm sewer or being washed into receiving waters. However, these low areas must be cleaned out periodically to maintain their sediment-trapping ability.

TARGET POLLUTANTS

Catch basins with sumps are effective for trapping coarse sediment and large debris (Oberts and Osgood, 1988). In addition to reducing sediment loads, catch basin cleaning also reduces the load of oxygen-demanding substances that reaches surface water.

EFFECTIVENESS

Typical catch basins have been estimated to retain up to 57% of coarse solids and 17% of equivalent biological oxygen demand (BOD). Two large sumps installed in storm sewers as part of the Lake McCarron wetland-treatment system retained as much as 75% of solids in runoff although the typical efficiency was much less (Oberts and Osgood, 1988).

Most catch basins have a sediment capacity of 0.5 to 1.5 cubic yards. The rate at which catch basins fill and the total amount of material collected during different cleaning frequencies is highly variable. In general, if the contributing watershed has active construction or other land uses that create high sediment loads, the catch basin should be cleaned more often than in stabilized areas.

If they are not cleaned, catch basins may actually worsen water quality. It has been reported that once a sump is 40-60% full, any inflow could have a flushing effect and actually generate a sediment loading in water passing through the catch basin (Pitt, 1985). Also, the material that accumulates in catch basins undergoes decay, and the first flush of stagnant water and debris in the sewer system by the stormwater runoff may contain a high concentration of pollutants. The concentration of metals and hydrocarbon pollutants in catch basin sediments are higher than in street dust (Mineart, 1994).

Although it is not possible (based on the data currently available) to quantify the water-quality benefits of catch basin cleaning, such cleaning does provide benefits. Over a year's time, monthly cleaning removes about six times more sediment than cleaning annually. Other benefits include the removal of pollutant loads from the sewer system, the reduction of high pollutant concentrations during the first flush of a storm event, and prevention of clogging of the downstream stormwater-conveyance system (Mineart, 1994).

In most cases, these residuals are not "hazardous waste." However, the material is contaminated well beyond levels associated with the raw storm water itself with a wide array of inorganic and

organic pollutants. Disposal without proper precautions would not be recommended regardless of the source of the residue.

Removed sediments should be handled in accordance with part 7.28, Sediment Handling.

7.32 System Structure: GRIT CHAMBERS

DESCRIPTION AND PURPOSE

A grit chamber is an enlarged chamber designed to settle out grit (sand, gravel and silt) in order to clean some of the storm water before it drains into lakes and streams. A grit chamber with an oil-removal mechanism, such as a skimmer, is often called an "oil grit separator." Grit chambers are often made out of large box culverts but they can be any size. Some are from small tanks with innovative swirl, filter or plate removal mechanisms. Many are enlarged pipes the size of the construction trailers on construction projects. These devices are buried underground or otherwise located so that the storm water will drain through them on its way to lakes and streams. Because of the size of the chamber, the water slows as it passes through and the grit settles out. The grit collects in the bottom of the chamber and a maintenance crew periodically cleans it out. With oil separators, skimmers and other oil-removal devices may be used to remove the oil separately from the sediments.

EFFECTIVENESS

Grit chambers are effective, but they have to be cleaned regularly. Full grit chambers are ineffective. Grit chambers typically have to be cleaned every one to six months. Storm sewer maintenance crews should keep track of how much material they remove from each of the chambers so they know how often to clean them.

Every cubic yard of grit that is taken out of a chamber, is one that does not get into lakes and streams. If this sediment is not intercepted, deltas form at pipe outlets and dredging is required periodically. Sediment build-up and dredging destroy and disrupt to the natural habitat of the animal and plant species in the waterway. Removed grit should be handled in accordance with part 7.28, Sediment Handling.

In most cases, these residuals are not "hazardous waste." However, the material is contaminated well beyond levels associated with the raw storm water itself with a wide array of inorganic and organic pollutants. Disposal without proper precautions would not be recommended regardless of the source of the residue.

Grit chambers are relatively expensive and are usually used where the cost of land would be prohibitive or where the resources are sensitive or valuable.

7.33 System Structure: ON-SITE TREATMENT SYSTEMS

DESCRIPTION

Sanitary sewers and storm sewers must be kept separate. One option for treating sanitary sewage in remote areas is an individual sewage-treatment system (ISTS), also known as a septic system. An ISTS generally consists of a septic tank and a soil adsorption system (also known as a drainfield or mound). An ISTS can provide a high degree of treatment of raw domestic sewage provided it is properly sited, designed, constructed and maintained. Industrial waste is regulated separately from raw domestic sewage and should not be discharged to the septic system, unless specifically authorized by the MPCA.

PURPOSE

The purpose of the ISTS is to treat raw domestic sewage to a level that will not pose a risk to human health and the environment. The treatment of the waste occurs in the septic tank and in the soil treatment system. Raw sewage flows into the septic tank, where the solids are separated from the liquids. The septic tank is sized to retain the sewage for 36 hours to provide the necessary separation of solids. The solids are trapped in the tank and undergo decomposition. The liquid effluent is further treated by the soil adsorption system. Its function is to provide treatment of septic tank effluent before it can enter surface or ground water.

SEPTIC SYSTEM PROBLEMS

Many small and some large communities rely on ground water for drinking water. With increasing residential and commercial development, the ground water may become contaminated. The improper use or design and construction of ISTSs can contribute to ground water pollution. Improperly constructed ISTSs can be a major contributor to the pollution of both surface and ground waters. Many products from industry or chemicals used around the house can be toxic to humans, pets and wildlife and may reach the ground or surface water.

Inadequate treatment can also allow excess nutrients to reach lakes or streams, promoting algal or weed growth. Algal blooms and abundant weeds not only make the lake unpleasant for swimming and boating but they also affect water quality for fish and wildlife habitat. As plants die, settle to the bottom and decompose, they use up oxygen that fish need to survive.

INSPECTIONS

Mandatory licensing of all ISTS professionals became effective March 31, 1996. The law (Minn. Stat. ch. 115) requires any business working on ISTSs to be licensed by the state. The licensee must meet the training, examination and experience requirements for the specific license sought and must follow the technical standards of Minn. R. ch. 7080.

A failing system is defined as any system that discharges sewage to a seepage pit, cesspool, drywell, or leaching pit, or to any system with less than 2 to 3 feet (ft) of soil or sand between the bottom of the distribution medium and the saturated soil level or bedrock, or any system posing an imminent

threat to public health or safety. Systems that are not in compliance for any of the reasons listed above must be upgraded, replaced, repaired or discontinued within a time period established by the local unit of government or the MPCA.

Septic tank cleaning is required on a regular basis. Removed substances must be disposed of under contract to a local sewage treatment plant or land applied in accordance with federal, state and local requirements. Contact the MPCA regional office for further information.

7.34 System Structure: MANAGING FLOOR DRAINS AND FLAMMABLE TRAPS

This part is adapted from MPCA Fact Sheet #4.18, April 1998.

PROBLEM

Washing and maintenance of vehicles, machinery, trailers, other equipment and floors could allow vehicle fluids and other materials into a floor drain, resulting in a three-phase waste (floating oils, dirty water and sludge) collecting in traps. These traps must be evaluated and managed appropriately. Using good housekeeping methods and following the BMPs outlined in this part will help ensure that this waste is nonhazardous, making it easier and cheaper to manage.

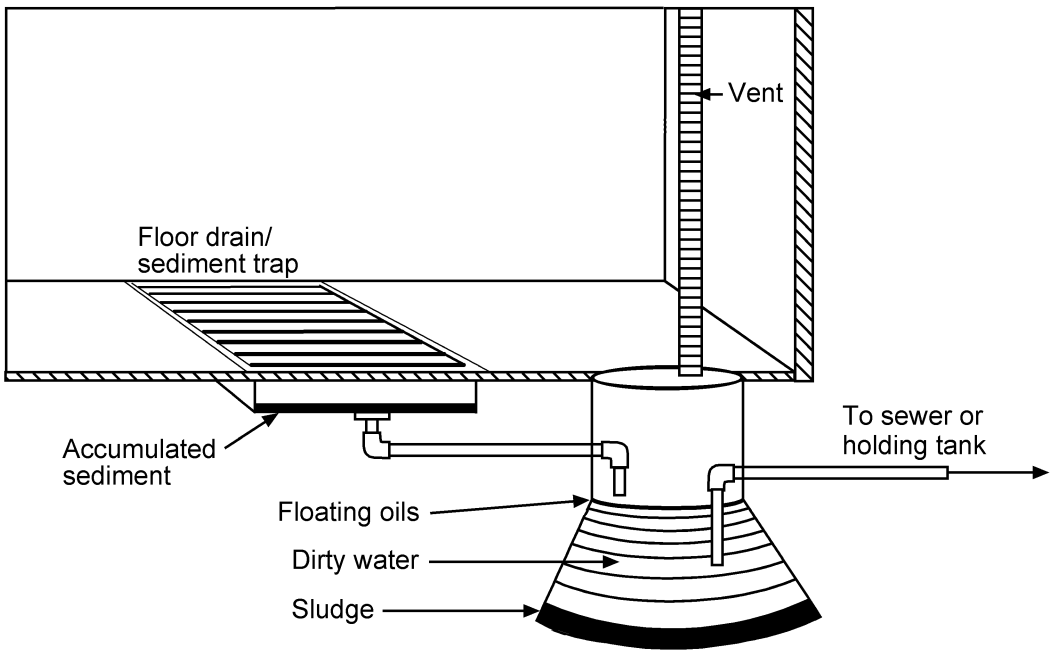

Figure 7.34-1 Phase trap waste

Businesses that discharge industrial wastes have additional concerns. If discharging to a holding tank, businesses must carefully monitor materials entering the tank to ensure they can be pumped and land applied later. Some waste can be approved by the system owner for discharge into a wastewater-treatment-plant (WWTP) system. Do not discharge industrial materials into septic systems as ground water contamination may occur and result in expensive environmental cleanups.

SOLUTION

Prevention is the best solution! Here are some preventive measures to consider:

1. Use good housekeeping techniques and follow the BMPs outlined in Table 7.34-1.

2. Follow good storage procedures: Use curbs or berms when possible; consider additional measures beyond those required for insurance purposes.

3. Cap drains in storage areas; eliminate them, if possible. For requirements and recommendations for capping drains, contact Gary Topp, Department of Health Plumbing Program, at (651) 215-0841.

4. Prohibit engine and transmission washing in vehicle wash and vehicle repair shops.

5. Sweep up nonhazardous solids on the floor and dispose of them in the solid waste. ***Hazardous materials should be collected separately and stored following hazardous waste requirements.*** For more information about hazardous waste storage requirements, request hazardous waste fact sheet #1.04/1.05, *Label and Store Hazardous Waste Correctly,* from the MPCA.

6. Use screens in the drain to prevent solids from reaching the trap.

   Use drip pans to collect fluids. First try to pick up liquids from the floor using a squeegee and dustpan. Combine recovered liquids with waste of the same type. For example, oil spills recovered with a squeegee and dustpan may be placed in the used oil container.

   If you cannot collect or recover liquid, use a sorbent material to soak it up. If using sorbent materials, they must be managed in the same way as the waste material they contain. (For example, if they contain used oil, they may be wrung and reused, burned for energy recovery or recycled.) Disposal of sorbent material in the solid waste is not allowed unless it has been shown to be nonhazardous.

7. Prepare and train for emergencies. Have a plan and the necessary equipment in place to quickly clean up a spill before it can escape.

8. Design and implement a plan to reduce the amount of slush and snow, sand and salt carried on tires before vehicles are parked indoors.

For more information or for help with prevention, contact the Minnesota Technical Assistance Program (MnTAP) at (612) 627-4646 or (800) 247-0015.

MAINTENANCE

Maintenance is second only to prevention in importance. Traps that are not cleaned regularly may allow oils and other chemicals into a septic system, holding tank or sanitary sewer, resulting in disposal problems and/or environmental damage. Be aware that maintenance of these systems may involve entry into a confined space and require additional employee training and precautions.

WASTE-MANAGEMENT OPTIONS

If you have not followed the BMPs in Table 7.34-1, you will need to test the liquid and solid portions to determine whether they are hazardous. Test results will determine how to manage each portion. Nonhazardous trap waste may be managed according to the guidance below. Hazardous waste must be managed according to the hazardous waste rules. For more information about hazardous waste management requirements, contact the MPCA.

If you carefully follow the BMPs, the MPCA allows you to assume that drain and trap wastes are nonhazardous. In most cases, these residuals are not hazardous waste. However, the material is contaminated well beyond levels associated with the raw storm water itself with a wide array of inorganic and organic pollutants. Disposal without proper precautions would not be recommended regardless of the source of the residue. Here are the options for managing them:

Floating Layer. If BMPs are carefully followed, little or no floating oily material should accumulate. (If there is a significant floating layer, the MPCA must assume that BMPs were not followed.) If a *thin* floating layer of oil is present:

1. Skim or vacuum the oil off and recycle it with other used oil.
2. Use an absorbent pad to remove the oil. Wring and reuse the pad or recycle it with other oil-contaminated sorbent materials by laundering, oil-extraction or burning for energy recovery. If these options for managing the absorbent material are not possible, test it for metal and volatile contaminants using the Toxicity Characteristic Leaching Procedure (TCLP). (For more information, see MPCA hazardous waste fact sheet #2.04, C*haracteristic Wastes*.) If the material is nonhazardous, it may be managed as an industrial solid waste and sent to a solid waste landfill or burner that can accept it. Check with the landfill operator before shipping!

Liquid Layer. Carefully following BMPs will keep levels of hazardous metals and organic compounds below maximum allowable concentrations. Your county solid waste officer or local WWTP operator can provide information to help you determine which of the following management options will work best for you:

1. If you are connected to a WWTP and discharge is approved, you may discharge the liquid layer to the sanitary sewer. The WWTP may require testing prior to discharge. Check with your local treatment plant operator first.
2. Nonhazardous liquid wastes discharged to a septic system or holding tank can often be managed like domestic septage. A certified septage hauler can pump out the waste and dispose of it at a WWTP or by land application in accordance with an MPCA-approved land application management plan. The WWTP should require testing. Check with your local treatment plant operator.
3. Send the liquid portion to a solid waste incinerator or power plant that is able to incinerate it. They may require testing. Check with your county solid waste officer to determine your local options.
4. Pretreat the liquid portion, using an appropriate pretreatment unit, such as an oil-water separator, reverse osmosis or activated carbon filter. Treated liquid may then be hauled or discharged to a WWTP (if approved by the plant operator), or land applied in an approved manner. Check with the MPCA to determine whether land application is appropriate. Contact MPCA's Underground

Injection Control Program for guidance. For help with pretreatment options, contact your local WWTP.

Sand/Sludge. Carefully following BMPs will keep levels of hazardous metals and organic compounds below maximum allowable concentrations. These are your management options:

- Dewater and send the sand/sludge to an approved mixed municipal or industrial landfill that is able to accept it. Contact the operator first; the landfill may require testing.
- Incinerate or thermally treat the sand/sludge (only if organic compounds in it are not halogenated) at an approved facility. For a listing of facilities, contact the MPCA.
- Some sand/sludge can be land treated in accordance with an MPCA-approved management plan. For more information, contact the MPCA.
- Send dewatered sludge to a mixed municipal compost facility if there is one in your area that will accept it. Contact the operator first.

Liquid and Sand/Sludge Together. If it will accept it, take or discharge to a WWTP. You must first get approval from your local WWTP operator to discharge.

Three Phases Together. If the waste is hazardous or you are not sure whether it is, vacuum it out. Then, ship it with a hazardous waste transporter who meets the U.S. Department of Transportation standards for transportation of hazardous wastes to a permitted hazardous-waste-disposal facility. (This may require testing; check with your transporter.) You may send this waste to a registered petroleum recycling-facility. A list of transporters, recycling facilities and treatment, storage and disposal facilities is available from the MPCA.

Table 7.34-1

Best Management Practices for Managing Floor Drains and Flammable Traps*

(Post in Shop)

Using these best management practices in your shop will enable you to manage flammable trap waste as an industrial solid waste rather than a hazardous waste.

If you:	You need to know that:	Best Management Practice
Use aerosol solvents or other degreasers	These chemicals can compound waste management problems by contaminating wash water and sludge with hazardous materials.	Clean parts over a drip pan — not on the floor; collect waste. Use a parts washer to clean engine parts and manage the solvent in the washer as a hazardous waste. To prevent contamination of the parts washer by listed** solvents, do not spray listed aerosols over the unit.
Change vehicle fluids (oil, brake fluid, antifreeze, etc.)	These chemicals can compound waste management problems by contaminating wash water and sludge with hazardous materials.	Use drip pans under vehicles to collect fluids. Recycle transmission and brake fluids with used oil. Drain radiators before flushing and recycle waste antifreeze.
Clean shop floors remove all screens	Hosing down the floors with water or solvent can flush contaminants into floor drains, contaminating liquids and sludges in the drain system.	Use drip pans to collect fluids. Use dry sweeping compounds. Reuse them as long as they remain absorbent. Combustible sweeping compounds may be burned to heat your shop if burned in an approved burning device.
Accidentally spill material	Many materials used in vehicle maintenance may be hazardous and can contaminate other wastes in the plumbing system.	Clean up spills immediately. Notify the Minnesota Duty Officer — (651) 649-5451 or (800) 422-0798 — if it is a petroleum spill of more than 5 gallons or if it is a spill of any material of any size that impacts soil or water. Have appropriate spill cleanup materials on hand and train employees how to properly use them.
Store solvents	Spilled or leaked solvents and their vapors are dangerous and can contaminate other wastes in the plumbing system	Keep containers sealed when not in use. Store solvents in a "flammables" cabinet. Do not use solvents near drains.
Store waste vehicle fluids in a room with a floor drain	Spilled or leaked solvents and their vapors are dangerous and can contaminate other wastes in the plumbing system	Keep containers sealed when not in use. Keep waste containers in a separate storage area with no floor drain. Install a curb or berm to contain any wastes that may leak from storage containers. Inspect containers for leaks on a weekly basis. See MPCA Hazardous Waste fact sheet # 2.41, *Documenting Container Inspections*.
Wash engines	The resulting wastewater is likely to be hazardous from greases, oils and solvents.	Only wash engines if absolutely necessary. If you do, separate the resulting wastewater and evaluate it.

* *From MPCA hazardous waste fact sheet #4.18 (April 1998).*

** *Listed solvents: Solvents on F-list like methylene chloride, methyl ethyl ketone, tetrachloroethylene, toluene and xylene.*

7.40 ACTIVITY-SPECIFIC PRACTICES

Activities applicable to an industry, a segment of an industry or an individual are addressed by the practices described for each activity. This is not a comprehensive list but is intended to address a variety of activities that help to illustrate how BMPs may be applied.

7.42 Activity-specific Practices: VEHICLE-WASHING SERVICES

DESCRIPTION

Vehicle washing involves the removal of dust and dirt from the exterior of trucks, boats and other vehicles, as well as the cleaning of cargo areas and engines and other mechanical parts. (Note: Discharge water from engine degreasing may be considered a hazardous waste and must be disposed of accordingly.)

TARGET POLLUTANTS

Washing of vehicles and equipment generates oil, grease, sediment and metals in the wash water as well as degreasing solvents, cleaning solutions and detergents used in the cleaning operations. The U.S. Environmental Protection Agency (EPA) considers wash water to be a non-stormwater discharge (*i.e.*, processed wastewater). Therefore, wash water from the facility must be directed to a sanitary sewer or treated on-site prior to discharge.

TREATMENT

Cleaning Chemicals

Cleaning chemicals can contain ingredients that pose threats to human health, if they enter ground water and drinking water supplies, and can be highly toxic to fish and other aquatic life. Here are some considerations in the use of cleaning chemicals:

- What are the goals in using chemical cleaners? Are these goals aesthetic only? Have you tried pressure cleaning with plain water, then steam cleaning without chemicals, to see whether these goals can still be achieved?
- Can you eliminate the use of some or all cleaning chemicals?
- Demand that vendors provide you with the *complete* ingredient list for each cleaner, so you can evaluate the potential risks of using the product. You will be introducing these cleaning chemicals into the environment, even indirectly through the sanitary sewer. You have the right to know 100% of the composition of a cleaner that may increase your environmental liabilities when you dispose of the washing wastewaters that contain the cleaning product.
- Dispersants and emulsifiers can limit the effectiveness and efficiencies of wastewater-treatment systems, especially in the removal of sediments, metals, oils and petroleum hydrocarbon pollutants. If immersion cleaning is used, emulsifiers may not be needed. Can you eliminate the use of chemical cleaners containing dispersants and emulsifiers?
- Alkylphenol ethoxylate (APE) non-ionic surfactant ingredients can biodegrade to compounds that are highly toxic, environmentally persistent, and may have adverse estrogenic or reproductive effects.

- Petroleum distillates (*e.g.*, kerosene, white spirits, mineral spirits, Stoddard solvent, petroleum naphtha) are sometimes unlabelled carrier solvents in some cleaners, and may be considered hazardous wastes after use. They can contain risky volatile organic compound (VOC) contaminants, such as hexane, methyl ethyl ketone (MEK), toluene, xylenes and naphthalene.
- Alkyl benzene sulfonates (ABS) and linear alkyl sulfonates (LAS) ingredients can be toxic to aquatic life, and may take a long time to biodegrade.
- Molybdates are sometimes corrosion-inhibitor ingredients in cleaners; molybdenum poses ground-water-contamination concerns.
- Caustic soda (sodium hydroxide) and potassium hydroxide are ingredients in many aqueous alkaline cleaners. If manufactured by the mercury cell process, these ingredients can contain significant levels of mercury. Be sure to request a low-level mercury analysis from the vendor of any product batch you purchase with these chloralkali ingredients.
- Acrylamide monomer, as well as acrylonitrile, are potential carcinogens. Both may be trace ingredients, or degradation products, of some acrylic polymers, particularly polyacrylamides. Acrylic polymers, which are often used as chelating agents in industrial cleaners, may be very persistent in the natural water environment.
- Phosphates are often used as chelating agents in industrial cleaners. Phosphorus poses water-pollution concerns, especially for lakes.
- Some cleaners, such as those with glycols, may deplete dissolved oxygen levels in surface waters when they biodegrade.
- Acids may also be used as cleaning agents, causing low pH and dissolving metals in the wash stream.

Sanitary Sewer Discharge

The preferred option is to discharge all wash water (except engine-degreasing water) to a wastewater-treatment plant with the approval of the plant owner, which is usually the city.

Holding Tanks

In areas not served by a sanitary sewer, a holding tank should be constructed to collect wash water from the wash station. The contents of the holding tank should then be hauled to a treatment plant or discharged to a sanitary sewer line.

On-site Treatment

Another suitable option is to contain and treat all wash water on the premises by using a detention pond or bermed area that will retain the wash water on site to evaporate and infiltrate. An individual NPDES/SDS permit is needed for such a treatment system, which cannot be covered under the general NPDES/SDS stormwater permits issued by the MPCA Separate containment is required for salt brine.

Vehicles should be washed in an area where the wash water can be treated and/or kept from infiltrating into the ground water. The primary BMP for washing operations is the identification of select areas where washing operations can be done. These areas should be located so the wash water can be directed to a place for treatment or collected for proper discharge. The following are BMPs for washing operations and/or handling of wash water:

- Use designated wash areas.
- Minimize rain water or snowmelt run-on conditions to wash area.
- Direct wash water to a sanitary sewer system or contain the wash water.
- Construct a concrete wash pad.
- Recycle/reuse wash water.

If you are currently washing on an outside lot, here are some suggestions:

- Initially clean vehicles without using water (*e.g.*, sweep loose material in cargo areas).
- Conserve water when rinsing and washing vehicles.
- Prevent seepage of salt brine into ground water.

An existing building could be used or a concrete or asphalt pad constructed that is large enough for at least one truck to be washed. The pad should have a collection sump and the wash water would flow by gravity or be pumped from the collection point to an existing sanitary sewer line. It is preferable to have a roof over the washing area to keep clean storm water out.

Collection of Wash Water with No Wash Station

In situations where a fleet of parked trucks is washed by a mobile washer, collecting the wastewater is more difficult. If the parking lot has a catch basin connected to a storm sewer, this can be used as a collection point. The storm sewer could be temporarily blocked or plugged so that a temporary pump or vacuum could collect the wash water and dispose of it in a sanitary sewer or holding tank.

Washing on Gravel or Dirt Lots

Washing on permeable soils will probably not create a surface water discharge, but there is still a concern about ground water impacts. Avoid washing trucks where there is no liner system to prevent wash water from infiltrating into the ground.

Recycling the Wash Water

Recycle units clean wash water only enough so that the water is suitable for washing but not rinsing. Therefore, rinsing will have to be done with fresh water. Normally, recycle units do not remove detergents, dissolved solids or heavy metals. This means your detergent usage will decrease, but it also means that if you recycle your wash water long enough, it will test hazardous and have to be disposed of at a hazardous-waste facility.

7.43 Activity-specific Practices: VEHICLE AND EQUIPMENT MAINTENANCE

DESCRIPTION

Fluids from vehicle-maintenance activities and breaking hoses also contribute to stormwater contamination on site or on a storage pile site. Any vehicle maintenance that has the potential to result in the loss of fluids or solvents should be done indoors on an impervious pad. Any spills should be cleaned up immediately. All fluids and solvents should be properly disposed.

The primary sources of stormwater contamination related to the maintenance of planes, vehicles or equipment are leaking fluids and the improper disposal of fluids removed during routine maintenance. A regular maintenance schedule for planes, vehicles or equipment provides periodic checking for leaks. Excess fluids in parking areas indicate the need for maintenance and/or checking for potential leaks. Parking vehicles in specified locations will identify slow, recurring leaks, and visual inspections of the pavement around specified parking areas will identify releases which may otherwise go unnoticed. Also, keeping vehicles washed and cleaned assists in identifying oil or other fluid releases from the vehicles. Once a leak is located, the following actions can be taken:

- Use an absorbent to clean up the spill and place a drip pan under the leak. If possible, move the vehicle or equipment inside. Schedule maintenance and identify the leak location. After maintenance complete, visually confirm that the problem has been corrected.
- When possible, all maintenance of vehicles and equipment should be performed inside. This greatly reduces the potential for spills to be exposed to storm water. If maintenance activities must be performed outside, provide drip pans and/or spill cloths for use under the area being worked on. Once maintenance has been completed, take the drip pan inside and place the fluids that accumulated in the pan in the designated container. Upon completion of the outside maintenance activity, inspect the maintenance area and clean it, if needed.
- Properly dispose of used oils and fluids. Keep documentation on file to prove that fluids were properly disposed. A regular schedule for proper off-site disposal of accumulated fluids should be established. Do not spread used oils or fluids outside to control dust or kill weeds. Clean drip pans when not in use and return them to their designated inside storage area.
- Traction sand, degreasing wastes, motor oil, motor oil filters, oil sorbent pads and booms, transmission fluid, power steering fluid, brake fluid, antifreeze, radiator-flush wastewater and spent solvents must be collected and disposed of in accordance with applicable solid- and hazardous-waste-management rules, including Minn. Stat. § 115A.916. These materials, which include the non-aqueous portion from flammable traps and oil/water separators, must not be released to surface or ground waters.
- As part of the regular maintenance schedule, check for releases from equipment and vehicles at least twice a year. The identification of releases and spills and the maintenance operations to repair or clean up these incidents are BMPs that will help decrease the amount of oil and grease exposed to storm water.

The following suggestions will help prevent pollution from vehicle and equipment repair operations.

Keeping the Workplace Clean

- Clean shop floors by sweeping, spot cleaning or other methods to prevent runoff into storm drains.
- Sweep clean surfaces that drain to the storm drainage system and properly dispose of the sweepings.
- Use drip pans in shops to hold fluids while doing repair work.
- Conduct repair work indoors.
- Clean up shavings, paint chips, dust and sandings and properly dispose of them.
- Drain cars, engines, transmissions, differentials, and equipment of all fluids when dismantling them for parts, and properly dispose or recycle the fluids.

Maintaining Drainage Systems

- Routinely inspect catch basins and clean when needed.
- Inspect the oil/water separator (inside or outside) and maintain appropriately.
- Handle removed wastes in accordance with part 7.34, Managing Floor Drains and Flammable Traps.

Washing Vehicles and Equipment

- Wash vehicles only with water if parking areas do not drain to a storm drain.
- If vehicles and equipment are washed with soaps, washed them only in a designated area that is covered and leads to a properly approved sanitary sewer system connection, recirculating system or sump.

Handling and Storing Materials

- Recycle or reuse hazardous materials whenever possible.
- Keep hazardous waste containers and dumpsters covered to prevent the contents from leaking out.
- Dispose of hazardous materials that are not recycled or reused through a treatment, storage and disposal facility.
- Properly label containers awaiting recycling or disposal as to their contents.
- Provide secondary containment for all hazardous materials.
- Handle materials carefully and keep the workplace orderly to prevent spills.
- Develop and maintain a spill-prevention-and-cleanup plan for each potentially harmful liquid, such as gasoline or oil.
- Post the spill-prevention-and-cleanup plan where it can be easily accessed.
- Dispose of used tires in an approved manner.

7.44 Activity-specific Practices: FUELING FACILITIES

DESCRIPTION

Fueling systems usually consist of two major components, the fuel-storage tank and the fuel-dispensing system. Other related fueling activities include mobile fueling and checking airplane fuel with a fuel sampler during the pre-flight check.

Fueling-related releases are a major source for contamination of surface waters and aquifers. Proper design and operation of fueling facilities and systems are high environmental priorities.

Fueling Areas

Minimize run-on of storm water into the fueling area by use of a canopy over the fueling area, berms or other diversionary measures.

Use dry cleanup methods for the fuel area rather then hosing it down. Use dry sweeping compounds, which can be reused as long as they remain absorbent.

Install treatment devices, such as filter strips, sediment traps or sedimentation ponds, to remove pollutants from runoff before it discharges from the site.

Developing an underground storage tank (UST) inventory control management plan can aid in detecting releases from UST systems and in minimizing the impacts associated with a UST release.

Above-ground storage tanks (ASTs) are being used more frequently for fuel as regulations and problems with USTs increase. For AST installations, provide for containment of a spill or a leak through use of a dike, berm or double-walled tank. Information on specific design requirements for above-ground fuel-storage tanks can be obtained by contacting the MPCA AST program.

When filling above-ground or underground fuel-storage tanks, follow standard procedures and the guidelines given in the UST inventory control plan.

Clean up minor spills with absorbent materials and dispose of these materials properly.

Clean up spills and releases in accordance with an established spill/release response plan.

Report all reportable spills and releases (five gallons or more) to the MPCA (State Duty Officer) spill hotline by calling (800) 422-0798 or (651) 649-5451.

All spills and releases reported to the MPCA must get a letter from the MPCA approving of cleanup procedures and a post-cleanup letter indicating satisfactory cleanup.

Fuel Dispensing

Spills often occur when fuel is dispensed into airplanes, vehicles and equipment. These spills tend to be small volumes, which may accumulate on the ground over time and/or get washed off by each rainfall. Visually, these small spills may not appear to merit concern, but they can result in a substantial quantity of pollutants being discharged from the site over time. Simple activities that help minimize the potential for spilled fuel to be discharged into storm water from the fuel-dispensing area are:

- Avoid topping off fuel tanks, which may cause spills by overfilling.
- Remove locking devices on fuel dispensing handles so that operators must hold the handle open and cannot walk away while filling tanks.
- Have absorbent materials available at the fueling area for use in cleaning up small spills.
- Instruct the operators on how to use absorbent materials and where to properly dispose of them.
- Do not wash or rinse fueling areas with water, which could cause fuel spills to be discharged into stormwater systems. Use absorbent materials to soak up spills.
- Provide a spill-containment system and education on spill-response procedures.

Topping off fuel tanks is probably the largest source of small spills. Simply educating operators and breaking old fueling habits will go a long way in minimizing potential pollution of storm water by fueling operations. More extensive dispensing area BMPs that could be implemented to minimize storm water contact with fuel spills include:

- Install a canopy over the fueling island to keep precipitation from falling directly upon the fueling pad.
- Provide impervious pavements at all fueling locations. This allows for spill cleanup using dry absorbent materials before precipitation can wash these spills away.
- Install a diversion berm and/or trench around the fuel-dispensing pad to minimize the quantity of run-on from outside areas. This, in turn, will keep fuel from small spills from being washed off the pad.

Mobile Fueling

Mobile fueling is more difficult to manage than fixed fueling facilities. The disadvantage of mobile fueling is the difficulty in controlling the following items for each of the many potential fueling sites:

- providing proper surface drainage conditions and discharge outlets,
- providing an impervious ground surface at the fueling locations, and
- providing containment/absorbent materials by each fueling location.

A major advantage of having mobile fueling is that it is more likely that fully trained, experienced individuals will dispense that fuel rather than less trained general users at stationary fueling stations.

The most effective BMP for mobile fueling is the identification of specified locations where this activity can be performed. Cleanup of spills in these areas can then be facilitated by having the appropriate cleanup equipment and materials adjacent to the fueling activity.

7.45 Activity-specific Practices: SURFACE-PREPARATION ACTIVITIES

SANDING, STRIPPING AND SPRAY PAINTING

Sanding, sandblasting, scraping and stripping boats, barges and bridges produces wastes that are toxic to fish, animals and humans. If possible, work indoors and collect the resulting waste. If you cannot work indoors, choose a day that is calm and use tarps and drop cloths to contain and collect the waste. When stripping paint, minimize the amount of waste generated by using only as much stripping chemical as is necessary.

Waste from sanding and stripping operations is often hazardous and must be collected for disposal. Place it in a closed container marked with the date, the words "Hazardous Waste" and a clear description of the waste (*e.g.*, Waste Paint Scrapings). Contact a hazardous waste hauler for disposal.

AIR-QUALITY ISSUES

Operators should track use of volatile organic compounds (VOCs). VOCs are found in solvents, petroleum distillates, antifreeze, paints, varnishes and thinners. If you use less than 200 gallons of VOCs in a 12-month period, an air quality permit is not required. If you perform spray-painting operations, you may need to do further calculations to determine whether a permit is needed. For more information, call the MPCA.

Steam or Pressure Cleaning

Do not perform pressure washing over the water. Use just enough pressure and cleaning agent to clean but not remove the paint. Again, choose water-based biodegradable cleaners. Do not allow harmful cleaners or solvents to escape into a lake or river. If possible, collect runoff from pressure washing, filter it, and reuse the water.

Use of Antifouling Agents

Antifouling paints work by releasing toxic chemicals from the paint, often into the surrounding air and water. In general, the more effective the paint, the more toxic its ingredients. When using or removing antifouling agents, remember they are regulated as pesticides and must be registered by the EPA and the Minnesota Department of Agriculture for use in Minnesota.

7.50 Material Storage: GENERAL REQUIREMENT

DESCRIPTION

Stockpiles are stores of material for subsequent uses, not for further disposal. They may be raw materials, containerized storage, or recycling and parts stockpiles. These materials often generate wastes through contact with storm water, wind erosion or releases, such as leaks and spills.

SITE MANAGEMENT

Cover

Inventories of materials should be managed so that needed materials can be stored in covered buildings. Tarps or other covers may be appropriate for large stockpiles and temporary storage areas.

Pads

Pads placed under material piles should be impervious. They prevent infiltration to the ground water and allow the storm water to run off the material pile and be collected for treatment.

Since material-pile runoff can be very acidic or corrosive, a material must be chosen that is impervious to the discharge.

Concrete can crack, resulting in infiltration. Also, concrete will not hold up under exposure to acidic runoff.

Asphalt can also crack, resulting in infiltration to the ground water. There may also be some contaminants associated with stormwater runoff from asphalt that are of a water-quality concern.

Compacted clay pads are recommended, but are expensive. The clay should be 3 ft thick.

A pervious base, such as gravel, will allow the water to infiltrate to some extent and will help control sediment loss. Runoff and leachate from storage yards should be sampled to determine whether they should be allowed to infiltrate the gravel (*i.e.*, that they will not pollute ground water).

The pad should be sloped to facilitate runoff to the proper areas, such as detention basins, when such treatment is required.

Berms

Berming is a practice that can prevent uncontaminated storm water from washing across the exposed stockpile and becoming contaminated. It also can keep storm water from carrying particulates off the site. The topography of each site should be evaluated for direction of surface flow. Impermeable berms can be used to route surface flows away from stockpiles, which should be on high ground so that surface water flows away from them.

A berm around the yard or storage area can keep off-site flows from the storage site and also help to slow down and capture yard runoff. Storage areas can be bermed on all sides with a ramp for truck and equipment access. If soil is used for the berm, it should be covered in vegetation to keep it intact and prevent erosion from the berm itself.

Vegetative Buffer Strips

Strips or areas of vegetation around the storage yards can also be used to control water entering or leaving the site. A vegetative strip will slow down water flowing from the site and can capture some of the sediment. Sediment controls in the yard, such as gravel, should also be used, as most vegetative strips will not be able to handle large sediment loads. Do not allow material storage or traffic through the buffer strips; the soil compaction may be detrimental to the health of the vegetation in the strip.

Source Area Controls

Many of the pollutants associated with storage facilities can be controlled with source area controls. Sediment and debris control can reduce total suspended solids, biological oxygen demand, chemical oxygen demand, floatables and the pollutants associated with wood chips, bark, sawdust and other natural materials.

Control of processing material can eliminate most of the stormwater pollutants associated with these materials. Many processing facilities retain all products and collected waste inside a building. The products and waste can then be loaded directly onto a truck for sale or use at the plant for fuel or other purposes.

If other chemicals, such as petroleum products or insecticides, are used at the site, special treatment may be required. Infiltration of storage area leachate should not be allowed until it has been determined that a discharge of this leachate to the ground water will not violate ground water standards.

Reduce Amount of Material Stored at the Site.

Source-reduction options include reducing the amount of material used and stored at the site. This should be given consideration in the facility pollution-prevention plan.

When adding to a pile, compact it and keep it as confined as possible. This will reduce the amount of material that comes in contact with storm water and reduce the potential for contaminants to be dissolved or dislodged and washed into a nearby water body. The following actions will help keep the pile intact:

- Keep only one pile on site if possible.
- Sites may be combined or moved to a more suitable location to reduce management needs.
- Each site where materials are stored should be evaluated for need.

HOUSEKEEPING

Sediment Control in the Yard

Regularly sweep the area back onto the pile to pick up any spillage and dust generated during loading and unloading.

Spray piles and roads as needed to suppress dust; however, do not spray to the extent that runoff from the site is created. The addition of 0.01 inch of water, either as rain or spray, will usually produce a dust-free condition.

The storage area should be paved to prevent sediment from being discharged and tracked off the storage yard.

Collection of Debris and Yard Material

As materials are removed from the storage area for processing, the areas on which they were stored should be cleaned. Loose material should be picked up. If there is a significant amount of soil mixed with debris, the material may be composted. A state permit may be required for the compost pile. The compost pile should be constructed and operated to avoid ground water and surface water contamination. It can be placed on a pad, with runoff collected and sprayed back onto it. The compost can be used for landscaping operations.

LOADING AND UNLOADING CONCERNS

A great deal of dust and spillage can take place when materials are bagged, conveyed or loaded. The following practices should be considered when materials are processed or loaded:

- Many materials should be handled indoors so dust may be contained. After handling operations, the dust should be swept up and disposed.
- If dust is generated when a truck is loaded a chute or boom should be used to place the materials in the truck and the truck should then be tarped. The area should be swept after the truck is loaded.

Much dust and spillage can occur as material is unloaded onto a pile and subsequently loaded onto vehicles for shipment off site. The following practices should be followed when material is being moved:

- If dust is being generated during loading, unloading or transfer, the material should be sprayed to control the dust. Many facilities must do this as a requirement of their air permit. Spray should be controlled to avoid creating runoff from the site.
- Spillage into a water body during loading and unloading must be prevented. The use of covered chutes or booms should be considered to prevent spillage.
- Uncovered storage piles should be evaluated for dust-control needs. Blowing material can be an irritant to neighbors and may damage vegetation near the site.

TREATMENT PRACTICES

Capture and Recycling of Yard Runoff

If there is more storm water and process water generated from the yard operations than can be safely infiltrated in the yard, it should be directed toward a ponding area. Sediment can then be allowed to settle out. The water can then be recycled and reused. Once the water is removed or recycled from the low-lying area, the debris should be collected. This debris can then be treated, disposed or reused. It is important to design the low-lying area so that it can be frequently drained and cleaned to avoid a buildup of waste.

Filtration and Vegetative Strips

Both filtration and vegetative areas can be used to keep storm water from washing across the material storage area and picking up contaminants.

Vegetative filtration areas can be used to allow infiltration of uncontaminated storm water into the ground before the storm water reaches the material pile. The amount of storm water moving towards the pile should be calculated. A filtration area can then be designed to allow all of this water to infiltrate before it reaches the material-storage area.

Both filtration and vegetative areas can be designed as shallow depressions to capture storm water and allow it to infiltrate over time. These practices should not be used with contaminated storm water unless approval has been obtained from the proper regulatory agency.

When source area controls do not keep pollutant levels low enough to avoid violating a water-quality standard or effluent limit, treatment of the material-pile runoff must be considered. When considering the following treatment options, the owner or operator may want to consider primary treatment of the initial runoff.

Recycling of Runoff Back onto the Pile

When infiltration of contaminated storm water is not a concern, the best treatment practice may be to spray the water back onto the material pile. If the pile is not on an impervious pad, extensive monitoring of the leachate should be done before the runoff is sprayed back onto the pile. The owner or operator must avoid allowing infiltration of leachate that will violate ground-water standards.

The runoff from the material pile can be collected in a detention ditch or basin. To avoid clogging the spray equipment, the runoff may need to be filtered before it can be recycled back onto the pile. Evaporation from the detention area may also reduce the amount of water to be recycled. Recycling back onto the material pile can be especially advantageous for piles that need dust control.

Detention and Settling

In some instances, settling of the material pile runoff may be enough to reduce pollutants to acceptable levels. The detention basin should be designed to remove 90% of the suspended solids from the runoff from a 1.25-inch or 0.3-year return frequency 24-hour storm event. See chapter 5 for a description of these definitions and methods of designing these facilities. The settling times needed will vary with the contaminant levels in the runoff and type of solids that were washed from the material pile during the rain event. The treatment outflow rate will not necessarily be the same as the rate defined for ordinary storm water. The treatment discharge rate depends on the particle size

distribution and needs to be adjusted to reflect the stockpile particle distribution size. Also note that settling alone may not bring the runoff to acceptable levels unless suspended solids are the only pollutant of concern.

Adjustment of pH

The runoff and leachate from some stockpiles, such as coal piles, can be very acidic. pH values of stormwater discharges from material-pile runoff must be between 6.0 and 9.0 to meet federal water quality effluent limits. Sampling results have shown that many times pH values of runoff from material piles, are below pH 6. If there is a direct discharge to surface water, the pH may need to be adjusted.

One method of pH adjustment is the addition of lime to the runoff, which requires an equalization basin for homogenous mixing of the runoff, a storage facility for the lime, a feed system, instrumentation, electrical connections and piping.

Removal of Metals

A number of metals, including chromium, copper, lead, nickel, antimony, mercury, selenium, zinc, beryllium, arsenic, aluminum and cadmium, have been shown to be of concern in material pile runoff. A long settling time may be enough to remove metals so the discharge meets water quality limits. If not, the metals must be removed to prevent the material-pile discharge from causing a violation of a water-quality standard.

Chemical precipitation or flocculation is one method to remove metals. A polymer can be added to the discharge to allow the metals to settle out.

Using a lime-feed systemto elevate pH can also be used to settle out metals which are less water soluble at higher pH levels. The sediment will need proper disposal.

A polymer-feed system can include storage hoppers, chemical feeders, solution tanks, solution pumps, interconnecting piping, electrical connections, and instrumentation.

Subgrade Cutoff Walls to Prevent Ground Water Contamination.

In instances where material pile infiltration or runoff is violating ground-water standards and an impervious pad is not an option, a subgrade cutoff wall may be an option. The cutoff wall can be a slurry or grout curtain. This wall is built around the material pile. It should extend to relatively impermeable subsoil to prevent movement of ground water under the slurry wall. The wall should have a permeability of less than 1×10^{-7} cm/sec.

A drainpipe system is placed inside the slurry trench below the ground water table. Collection pumps located at various points around the slurry wall keep the ground water level inside it slightly lower than outside it to prevent migration of material pile leachate into the surrounding ground water. This system also prevents excessive migration of uncontaminated ground water into the material pile area. The sumps empty into an impervious basin. This water is then treated as necessary to remove any pollutants that could cause a violation of a water-quality standard.

7.51 Material Storage: SNOW PILES

DESCRIPTION AND PURPOSE

Winter maintenance operations involve snow plowing, sanding, and salting of roadways, parking lots, sidewalks and other impervious areas. Snow piles containing sand and salt that build up over the winter months, generate concentrated releases of sand and salt during spring snow melt conditions. Also, trash and debris usually accumulate in snow piles during snow plowing operations. Therefore, five months of potential pollution accumulation may occur over the winter months for rapid release in the spring.

DISCUSSION

Plowed snow cannot be directly discharged to lakes, streams or wetlands. Storage locations should be chosen to avoid direct drainage into surface waters. Ice, snow, salt, sand, sediment and debris are all components of plowed snow. Snow piles require some monitoring for blowing debris. Also, plan to contain sediment and sand after the snow melts in the spring and give consideration to aesthetic issues. As snow piles melt, sediment will accumulate on the surface of the melting ice and the piles will appear black. This is visually unappealing and may be a source of complaints.

Pay attention to the location of snow piles, avoiding nearby surface runoff discharge points and impervious surfaces.

Install berms, skimmers and detention ponds to settle sediment and trap debris.

Place snow piles so as to avoid or divert surface water run-on from areas outside the snow piles.

During spring melt conditions, visually observe the snow piles for runoff/run-on conditions and debris contained in the snow.

Do not pile snow into wooded areas, around trees or into vegetative buffers. The equipment operators usually try to get the snow as far into the area as possible and wind up striking the tree trunks. These injuries eventually lead to rotting of the trunks and premature tree death.

7.52 Material Storage: SALT PILES

DESCRIPTION AND PURPOSE

De-icing chemicals are used each winter on roads, parking lots and sidewalks in Minnesota. Sodium chloride (salt) is the main chemical used. Proper use and storage of salt will reduce the chance of high chloride concentrations in runoff that may damage the environment.

TARGET POLLUTANTS

Sodium chloride is the main pollutant addressed by this practice; however, trace metals in runoff have also been found to be associated with the use of salt for de-icing (Oberts, 1986).

A complex iron cyanide (sodium hexacyanoferrate II) is added to road salt to keep salt piles from caking. Research has demonstrated that sodium hexacyanoferrate II will dissociate under varying environmental conditions (*i.e.*, ultraviolet rays, pH and specific bacterial populations) to release hydrocyanic acid, more commonly referred to as free cyanide (Cherryholmes, 1981; Cherryholmes *et al.*, 1983). Typically, 0.25-0.50 lb of sodium hexacyanoferrate II is blended with each ton of road salt. Recent (1999) monitoring of runoff from salt piles by the MPCA has shown free cyanide concentrations that range 130-890 micrograms/L. These concentrations exceed acute toxicity levels.

EFFECTIVENESS

It has been estimated that most of the environmental damage from de-icing chemicals is caused by the concentrated runoff that can be created by inadequate storage facilities. Proper storage practices can control sodium chloride pollution in runoff from stockpiles. Virtually all salt applied for de-icing eventually enters surface or ground water (Pitt, 1985). Therefore, any reduction that can be achieved by preventing overapplication of salt would reduce chloride loading by an equivalent amount.

PLANNING CONSIDERATIONS

To prevent salt brine chloride from entering surface or ground water, the following practices should be used at stockpile locations to minimize the opportunity for the chemicals and water to come in contact with each other:

- Salt piles should be on impervious surfaces.
- All salt piles should be covered with polyethylene if they are not in a shed. Cover outside sand/salt piles with tarps and use diversion berms to minimize run-on.
- All sand/salt piles should be moved to areas not subject to flooding and placed in salt sheds or covered during the nonfreezing spring and summer months.
- Any runoff from stockpiles should be contained for disposal or added back to a winter sand pile.
- Wash water from trucks used for salting and sanding is very high in chlorides. To avoid groundwater contamination, this water should not be discharged to septic system drainfields. Wash water should be contained for disposal, or discharged into sanitary sewers. Earthen basins are

generally ineffective in storing salt brine runoff unless they are sealed and do not have a discharge.

OTHER CONSIDERATIONS

The quantities of salt applied can be reduced in several ways. The first is to prevent over-application. A second way is to watch the weather; anticipation of storms, including their duration, temperatures, and conditions allows for planning that reduces the need for deicing materials. A third way is to properly calibrate equipment and closely monitor the need for de-icing material. A fourth method is to limit salt application on low-traffic areas and straight, level areas. Critical areas, such as intersections, hills or major roads, will need higher levels of service.

7.53 Material Storage: COAL PILES

DESCRIPTION AND PURPOSE

Coal is used by power companies and industries for fuel. It is stored at various locations in route from the mine and at the point of use. The size of these storage piles can range from several to hundreds of thousands of tons. Coal is often stored on harbor docks and near bays as it is transferred from one type of transportation to another. It is usually stored outside as it is easier to load and unload in large areas and there is less danger of spontaneous combustion (Schueler, 1992).

POLLUTANTS

Contaminants from coal piles exit the pile either through runoff (storm water running off the pile during a rainstorm), leachate (water trapped in the pile infiltrates into the ground water or is flushed out during rain storms) and airborne emissions. Runoff from the pile can also occur when the pile is sprayed to control dust emissions. Water pollution can also occur during loading and unloading of coal. Coal can be spilled directly into the water, or dust can be generated during the transfer of coal between the rail car, storage pile or ship.

The vast majority of the monitoring results either meet or exceed these limits for metals (including chromium, copper, lead, nickel, antimony, mercury, selenium, zinc, beryllium, arsenic, aluminum and cadmium), suspended solids, pH and polyaromatic hydrocarbons (PAHs), including phenanthrene, pyrene, benzidine, benzo (ghi) perylene, flouranthene and acenapthene. A literature review done for the Pennsylvania Power and Light Company concluded that "many if not all constituents of coal pile seepage are far in exceedance of the water quality criteria" (Ripp, 1988).

Several studies have also concluded that coal pile leachate may be a source of ground water contamination (Mann, 1981).

Coal piles located next to surface waters may contribute pollutants to the surface water via runoff and ground water infiltration. If depth to ground water is shallow and ground water is discharging into the surface water, there may be little or no attenuation of pollutants from the time water infiltrates beneath the pile until it discharges into the surface water.

Use of Low-sulfur Coal

High-sulfur coals tend to produce runoff and leachate, which have lower pHs and higher concentrations of metals and organic compounds. There are, however, some problems associated with the use of low-sulfur coal. It has a lower BTU value per pound, thereby requiring more coal to achieve the same energy output. Low-sulfur coal is also more spontaneously combustible, increasing the likelihood of fires in the pile. Also, electrostatic precipitators, used for reducing air emissions, do not function as well with low-sulfur coal.

7.54 Material Storage: WOOD-PROCESSING PILES

DESCRIPTION

As logs are harvested from a forest, they are stored in piles in the forest or placed in intermediate storage locations. The logs are eventually transported to wood-processing facilities.

Once on site at the wood-processing facility, the logs are eventually debarked and then cut or chipped, depending upon the eventual use of the wood. The debarking process results in large amounts of bark debris. The cutting and chipping processes leave behind piles of sawdust. The bark and sawdust is either stored on the sawmill site, burned for fuel at the sawmill or placed in trucks and sold for fuel or to mills to use in paper-making operations. Bark chips and sawdust are also occasionally sold or given away for landscaping purposes.

POLLUTANTS

Logs, bark and sawdust stored outside have been shown to contribute a number of pollutants to surface waters and ground water. These pollutants include biochemical oxygen demand (BOD), chemical oxygen demand (COD), fecal coliform bacteria, phenols, tannic acid, sediment and hydrogen sulfide. Aesthetics are also a concern with log leachate and storage pile runoff. Runoff from log-storage facilities, which is noticeably darker than surface water, is not aesthetically pleasing. There may also be floatables associated with discharge from some log- and wood-storage facilities.

Federal effluent limitations from mechanical-barking and log-washing operations are applicable.

Collection of Bark

Each wood-processing operation must have a plan to properly dispose of bark. Debarking should take place indoors or under cover. Bark will then either be chipped or left in strips to be used for fuel or by other wood-processing facilities. In either case, the bark should be placed directly in trucks for transportation to the facility that is buying the bark or utilized on site without being exposed to rainfall or storm water.

If used on site, the bark can be moved by covered conveyors to the appropriate point on site or placed in trucks and transported to an indoor or covered facility on site. If it is necessary to store bark or bark chips uncovered outside, the storage site should be appropriately bermed and the runoff treated. Berms should be placed to keep uncontaminated storm water from flowing across the bark-storage area. Storm water that comes in contact with the bark should be collected and the debris and sediment removed before it is allowed to discharge off the site. This can be done by using a settling pond. Or, the runoff can be recycled and used for site-spraying operations.

Collection of Sawdust

As sawdust is generated, it should be contained indoors or under cover. There is a potential for spontaneous combustion in sawdust piles. Sawdust can be used as a fuel on site. It can also be sold for fuel or used in other wood-processing operations. If used on site, it should be transported under cover to the appropriate location. This can be done using covered conveyors or trucks. If sold to another facility, sawdust should be bagged indoors or placed in a covered truck for transport.

Sawdust should never be exposed to rain or storm water. Stormwater discharge permit requirements do not allow a discharge of floatables from the site. It is difficult and expensive to remove sawdust from runoff and it is difficult to clean it from yards.

Proper Storage of Wood Chips

At some facilities, wood chips are brought on site and used as the main material in the facility's operation. At other sites, wood chips are generated in the facility's operation and subsequently sold. At either type of facility, wood chips must be properly handled to avoid contamination of storm water. It is strongly recommended that wood chips be kept under cover or indoors. Stormwater-discharge permits do not allow any discharge of floatables. If wood chips get into the storm water, they must be removed before the contaminated storm water can be discharged from site. If storm water that becomes contaminated with wood chips should be routed through a detention basin and screened before it is allowed to discharge.

7.55 Material Storage: USE AND DISPOSAL OF TREATED WOOD

DESCRIPTION

Wood is often with chemical preservatives to make the wood last longer. While wood treatment lengthens the useful life of the wood, thus conserving timber, the chemicals used in treating wood are toxic and can create a need for special use and disposal practices. Wood treated with the following chemicals is addressed in this section: pentachlorophenol, (or "penta," used typically for telephone poles, declining in use); creosote (typically used for railroad ties), and arsenic preservatives (chromate copper arsenate, or CCA, or other preservatives containing arsenic and/or other heavy metals typically used for structural wood). Constituents of concern in these chemicals are dioxins and furans in penta, creosols in creosote, and arsenic and chromium in arsenicals.

POLLUTANTS

While these preservatives are toxic, the wood they are contained in may not necessarily display the toxicity characteristic of hazardous waste. In fact, industry testing has shown that creosote- and penta-treated wood does not display the toxicity characteristic. However, arsenically treated wood has been shown to be toxic. Because of the toxic constituents contained in treated wood, there are special precautions for its use and disposal.

Use of Treated Wood

There are some restrictions on the use of treated wood for structural purposes. The use of treated wood is prohibited in situations where the wood would come in contact with human or animal food or drinking water and in beehives. However, use of treated wood is allowed where it would come into contact with surface water, such as for docks or supports for bridges. Use of treated wood is also allowed where it comes into contact with ground water, as in building foundations. For more information on the use of treated wood as it applies to ground water, contact the MPCA. For more information on the use of treated wood, contact the Minnesota Department of Agriculture.

Reuse of Treated Wood Waste

Treated wood that is to be reused is not considered a waste, so it is not subject to disposal requirements. For example, old railroad ties may be used for landscaping. Caution should be used to ensure that people or animals will not be exposed to chemicals from the reuse of the treated wood.

Operations storing treated wood waste that is to be recycled or reused may be subject to solid waste permitting if more than 10 cubic yards of treated wood waste is stored for more than 48 hours.

For more information on the requirements for treated wood waste that is to be reused or recycled, contact the MPCA.

Use of Treated Wood as Fuel

Treated wood may be burned at industrial or commercial sites as long as the wood is not found to be hazardous waste and as long as the burner has addressed treated wood as a fuel source in their air emissions permit. Municipal-solid-waste combustors may also burn treated wood under these conditions, and must also address treated wood in their industrial waste-management plans. Ash from the burning of treated wood is subject to evaluation to determine whether it is hazardous waste.

The burning of treated wood for heat in wood stoves, fireplaces, or campfires is illegal since the burning of the wood releases toxins into the air, from which they may be inhaled. ***Do not open burn treated wood!***

For more information on the burning of treated wood waste, contact the MPCA.

DISPOSAL OF TREATED WOOD

Hazardous Waste Regulation

The hazardous waste rules allow households to manage treated wood waste they generate as solid waste. However, the hazardous waste rules do require businesses to evaluate waste they generate to determine whether it is hazardous. Treated wood waste that is considered to be demolition debris (wood from demolished structures) is exempt from hazardous waste regulation.

Though all treated wood has the potential to display the toxicity characteristic of hazardous waste, only arsenicallytreated wood has been shown to be toxic hazardous waste. Although federal regulations exempt arsenicallytreated wood from hazardous-waste-management requirements, the Minnesota hazardous waste rules do not. Therefore, businesses generating arsenically treated wood waste that is not demolition debris must determine whether the treated wood waste is toxic. If it is found to be a toxic waste, it must be managed as a hazardous waste.

Penta- and creosote-treated wood waste has been shown to only contain low levels of toxic constituents. Based on industry data, generators of creosote- and penta-treated wood waste may assume that it does not exhibit the toxicity characteristic and manage it as industrial solid waste.

For more information on the hazardous waste requirements for treated wood waste, contact the MPCA.

Solid Waste Regulation

Although demolition debris containing treated wood is exempt from hazardous waste regulation, demolition landfills are prohibited from accepting treated wood waste unless the demolition landfill is lined. Treated wood waste not regulated as hazardous waste may be disposed in municipal solid waste landfills. Construction debris is accepted by landfills, but many landfills will not accept some types of treated wood. Check with the Industrial Waste Management Plans at the landfills. Because of the restrictions on land disposal of treated wood waste, disposal by regulated burning processes may be more appropriate or feasible in some situations. For more information on solid waste requirements for treated wood waste, contact the MPCA.

Requirements for Wood-treating Activities

Operations that commercially treat wood are subject to specific site and waste-management requirements, including using drip pads and disposing of spent preservative formulations as hazardous waste. For more information on the requirements for wood-treating operations, see the MPCA fact sheet, *Hazardous Waste from Wood-Treating Operations*.

Treating wood after it is already in place or in use should be done with great caution to prevent the toxic preservatives from contaminating the environment. For example, surface water has been contaminated in the past from the application of wood preservatives to bridge supports standing in water. Reapplication of preservative should either be avoided, or done with precautions for preventing environmental contamination.

7.60 Containerized Storage: GENERAL

DESCRIPTION

Compounds, such as fuels, lubricants and solvents, are kept in some type of storage containers. For the purpose of this manual, containerized storage is defined as storage in above-ground or underground storage tanks or in drums.

Containerized storage management involves compliance with the requirements of local, state and federal regulations, as well as sound management practices to prevent and/or minimize the possibility of a leak or spill. Regulations for containerized storage vary and are dependent on volume, type of product stored, use of product, and proximity to surface water.

Best management practices are to safeguard ground water resources, protect the water from future degradation and to correct existing water-quality problems.

POLLUTANTS

Many storage containers have released or will release chemicals into the environment through spills, overfills or leaks. The greatest potential hazard from a leak or spill is that the substance can seep into the soil and contaminate ground water or surface waters.

Spills and overfills often result from bad filling practices. Human error causes most spills; many result from spills made during delivery. Spills and overfills can be avoided by following good filling practices and installing overfill-protection devices. Faulty installation or inadequate operating and maintenance procedures also can cause storage tanks to release their contents to the environment.

SOURCE AREA CONTROLS

Storage

- Store drums inside if doing so is permitted by the fire marshal. If drums are to be stored outside, create some type of shelter so that the drums are not directly exposed to the elements.
- Prepare and train appropriate employees in properly dealing with spills and leaks. Properly trained employees will be equipped to avert or at least minimize a leak or a spill.
- Install some type of impervious surface under drums. Store drums on this impervious surface to minimize the potential of leaks or spills.
- Prevent run-on to, and runoff from, the tank/drum storage area and provide adequate containment to hold spills and leaks. This can be accomplished by use of overhead canopies as well as berms or other measures to prevent the run-on and runoff of storm water. Covered spill pallets or secondary storage containers made of appropriate materials can be used for secondary containment.

7.61 Containerized Storage: UNDERGROUND STORAGE TANKS

DESCRIPTION

(Minn. R. ch. 7150)

Regulated tanks:

Includes:	Exempt:
	All tanks of less than 110 gallons capacity
Petroleum tanks over 110 gallons Farm and residential motor fuel tanks over 1,100 gallons	Farm and residential motor fuel tanks that hold 1,100 gallons less containing a product not for resale
Heating oil tanks over 1,100 gallons Used oil tanks over 110 gallons	Heating oil tanks that hold 1,100 gallons and less containing product used consumptively on the premises where stored
Hazardous substance tanks over 110 gallons	

General requirements for regulated tanks:

Registration with the MPCA Corrosion protection for tank and piping	Use of certified contractors for installation, repair and removal
Approved method of leak detection, spill containment and overfill prevention	Ten-day notice to MPCA prior to tank installation or removal

Notes:

1. Regulated bare steel/asphalt-coated steel tank systems installed before December 22, 1988, are required to be upgraded with corrosion protection (tank and piping), spill prevention and overfill prevention by December 22, 1998.
2. Used oil tanks do not require spill containment and overfill prevention unless a quantity greater than 25 gallons is placed in the tank at one time.
3. Tanks used to store hazardous substances must comply with the above requirements and also must have secondary containment and interstitial monitoring (CERCLA Sec. 101 (14)).
4. Spill containment provided by a catchment basin. Overfill prevention provided by an automatic shut-off device, overfill alarm, or ball float valve.

5. Corrosion protection of the tank is provided by one of the following:

- Steel tank has corrosion-resistant coating ***AND*** cathodic protection.
- Tank is made of noncorrodible material (such as fiberglass).
- Steel tank is clad with (or enclosed in) noncorrodible material.
- Uncoated steel tank has a cathodic protection system.
- Uncoated steel tank is interior lined with noncorrodible material.
- Uncoated steel tank has cathodic protection ***AND*** is lined with noncorrodible material.

6. Corrosion protection for piping provided by ***one*** of the following:

- Uncoated steel piping has corrosion protection.
- Steel piping has a corrosion-resistant coating ***AND*** cathodic protection.
- Piping is made of (or enclosed in) noncorrodible material.

A method of leak detection should be installed on the tank and piping since the deadline for leak detection has passed already.

7.62 Containerized Storage: ABOVE-GROUND STORAGE TANKS

GENERAL REQUIREMENTS FOR REGULATED TANKS

(Minn. Rules ch. 7100)

Facilities that have less than 1 million gallons in tank capacity are covered under a general permit issued on November 1, 1995. These requirements pertain to above-ground storage tanks storing liquids, such as petroleum products, used oil, chemicals, food products and pulp. A site is considered to have a liquid storage permit for its above-ground storage tanks if the following requirements are met.

Tanks over 110 gallons capacity must be registered

Includes:	**Exempt:**
Petroleum tanks Chemical tanks	Farm, residential, and heating oil tanks 1,100 gallons and less
Farm, residential and heating oil tanks over 1,100 gallons	Flow-through process tanks Compressed gas tanks
	Agricultural chemical tanks

Tanks over 1,100 gallons capacity must have secondary containment

Includes:	**Exempt:**
Petroleum tanks Chemical tanks	Farm, residential and heating oil tanks 1,100 gallons and less.
Tanks which store a liquid which *could* pollute the waters of the state	Flow-through process tanks. Compressed gas tanks.
Food tanks (*e.g.*, molasses, vegetable oil)	Agricultural chemical tanks.

Notes:

1. Tanks of 1,100 gallons and less capacity that are located within 500 ft of surface water must have full secondary containment:
   - 110% capacity of the largest tank in the area
   - Materials reasonably impervious to, and compatible with, product stored
   - Secondary containment for regulated tanks must comply with Minn. R. 7100.0030
2. Tanks of 1,100 gallons and less capacity that are located beyond 500 ft of surface water must have reasonable safeguards to prevent a release into the environment, such as:
   - Concrete pad or floor
   - Location away from drains
   - Sorbent material on site
   - Good spill plan on site
   - Other methods which achieve the result of pollution prevention
3. Tanks of 1,100 gallons and less capacity that are used for storage of nonhazardous materials are not required to be registered under Minn. Stat. § 116.48.

It is a special condition of the general permit that tanks be monitored at least once a month for leaks or other problems. Results of the monitoring must be documented.

Larger facilities may need to obtain additional permits from the MPCA. Sites that store flammable liquids need approval from the State Fire Marshal's office. Local jurisdictions may have permit requirements.

FOR FURTHER INFORMATION

The information provided has outlined the general requirements for most types of storage containers. Please refer to the following list of regulations to ensure compliance with the appropriate regulations:

- UST - Minn. R. ch. 7150, Technical Standards for Underground Storage Tanks
- AST - Minn. R. ch. 7100, Storage or Keeping of Oil and Other Liquid Substances
- Drum Storage - OSHA Regulated - 29 CFR 1915
- Minn. Stat. chs. 115 and 116

7.70 FACILITY-SPECIFIC ACTIVITIES

7.71 Facility-specific Activities: MARINAS, BOATING AND FISHING

Many recreational activities involve the use of motorized watercraft, including jet skis, inboard and outboard motor boats for fishing or water-skiing, and houseboats, or even snowmobiles on lakes and rivers. The following BMPs will help minimize potential damage to lakes and rivers:

- Avoid spilling gas, oil, paint, varnish or stripper, and never pour liquids over the water during fueling or boat maintenance.
- Do not "top off" fuel tanks.
- Install fuel-storage tanks away from the waterfront.
- Properly store and dispose of all wastewater, both graywater (from sinks) and human waste, while boating or fishing, especially on houseboats.
- Adjust your speed to reduce the wake and consequent wave action that can damage the shoreline.
- Observe surface water use guidelines, including no-wake and low-speed zones.
- It is illegal to deposit fish entrails or parts into public waters or onto lake or stream shores. Fish responsibly.
- Inspect boats and trailers to avoid moving non-native plants or animals from one water body to another. In Minnesota, it is illegal to transport exotic species.
- Store and properly dispose of wastewater when ice fishing. Human waste from several ice houses can have a significant impact on the water quality of a lake or river.
- Prevent contamination of bilge water by oils and gasoline.
- Do regular maintenance to prevent oil leaks and fix leaks promptly.
- Place an absorbent pillow in the bilge that is designed to pull oil and other petroleum products out of the water. These pillows can hold over a gallon of petroleum product and can be wrung out and reused/recycled.

MANAGING WASTE

Discharging sewage to waterways is illegal. To encourage proper disposal of sewage, marinas should provide pumpout facilities or dump stations and public restrooms. To encourage proper disposal of sewage, post numerous signs explaining:

- that discharging sewage into the water is prohibited and
- where pumpout services and public restrooms are located and how to use the pumpout facilities.

Three types of pumpout systems often used by marinas include:

1. Fixed point: Often used by marinas servicing larger boats, these collection systems include one or more centrally located sewage pumpout stations.
2. Portable or mobile: Considered by many smaller marinas to be the most convenient, accessible and affordable, portable units consist of a pump and a small storage tank. They may also have a discharge hose. Note: Even though they are portable, moving these systems can be difficult.
3. Dedicated: Usually used by larger marinas servicing live-aboard vessels, dedicated "slipside" systems provide continuous waste-water collection at a slip through a "hydrant" located on the

dock by each slip. Other areas of the marina may be serviced by a fixed-point or portable system.

Dealing with Wastes from Boat Maintenance

When washing boats above the water line, always choose water-based, biodegradable cleaners rather than detergents containing ammonia or sodium hypochlorite, chlorinated solvents, petroleum distillates or lye. Read labels carefully and handle products according to instructions. Collect spills and residues and dispose of them appropriately; use of chemical cleaners will often result in a hazardous waste.

Wash the hull above the water line by hand. Removing the boat from the water will make it easier to capture the debris for proper disposal. Do not scrape the hull while the boat is in the water.

7.72 Facility-specific Activities: AIRPORTS

Airports include a wide range of activities that are covered under many of the previously discussed BMPs. In addition to those previously discussed activities, the following BMPs may be applicable.

These facilities are required to get an Industrial Storm Water General Permit or Individual Storm Water Permit from the MPCA. The permit requires a management plan (the Plan) for stormwater runoff. The MnDOT has developed general guidance on how to develop a stormwater plan, listing the various problem areas and suggesting potential solutions. The plan needs to specifically address the various potential problems at the site.

Preflight Fuel Samples

During preflight checklist procedures and after fueling smaller airplanes, three fuel samples are commonly obtained to check for the presence of water, grit and proper fuel. If the fuel is contaminated, additional samples may be taken. It is common practice to throw contaminated samples, and even clean samples, into the air or onto the ground, contributing to air pollution (when the fuel vaporizes) and stormwater pollution (when fuel residues are washed away with storm water).

The simplest BMP for fuel-sampling operations is to recycle samples. Provide barrels or other containers at each fueling location for disposal of samples. Use fuel testers which separate out all non-fuel contaminants; this can allow the fuel samples to be put back into the airplane. As with any pollution-control effort, considerations of convenience and location of the disposal systems are critical to assuring they will be used. With proper education of airport users, fuel sample disposal can become a routine activity, like walking to a garbage can to dispose of garbage. The education program developed for a particular airport facility can identify the best way to educate airport users on this issue.

The key to controlling fuel spills and implementing cleanup procedures when spills occur is getting employees interested and providing adequate and easily assessable materials for them to use as part of their routine activities.

Airport Deicing (Runways, Taxiways)

Winter maintenance operation should address sand, salt and snow plowing BMPs and/or runoff from parking lots, roadways. Airport deicing on the runway and taxiways should address the fate of the materials used for deicing. Urea and sand are the materials typically used for deicing.

Reviewing the chemical decomposition of urea is helpful in understanding why this chemical is considered an environmental pollutant. Urea, when chemically reacted with ice or water, breaks down into ammonia. Under proper conditions, the ammonia will result in a nitrate composition. Urea, as with glycol (described later), has a high biological oxygen demand (BOD) in water. Sand contributes to sediment loading when it is carried off-site by storm water.

There are minimal options to attempt to reduce the uses of these materials. The BMP for these materials is to use them wisely under the appropriate conditions. As always, safety should be the

first concern in considering application rates. Proper application techniques should be used to minimize wasteful application. Monitoring the spray (cast) of applicators can reduce overspray and waste, directing the material where it is needed.

Constructing a detention pond and/or constructed wetland-treatment system may assist in removing some of the solids and/or organics in the deicing materials.

Snow plowing operations should be monitored and directed so that snow is accumulated in areas where it is least likely to run off when it melts, carrying contaminants with the runoff water. If possible, snow piles should be placed in areas where treatment systems are available to treat runoff and where the runoff drains directly to the treatment system.

Airplane Deicing

Airplane deicing operations typically involve the use of the chemicals ethylene and propylene glycol. When released into water, these chemicals have a BOD. It is estimated that each gallon of glycol has an oxygen demand equal to raw sewage generated from 25 people per day. Airports' usage of glycols varies, depending on weather conditions, type of planes and number of flights per day. Using 20 gallons per day results in a significant environmental impact. Large airports can use up to 400 gallons per plane and up to 20,000 gallons per day. According to an EPA notice published in the Federal Register, "Deicing fluids have been implicated in several fish kills across the nation." Therefore, deicing operations and the use of glycol need special attention.

Typically, deicing occurs at loading/unloading areas, terminal gates or on taxiways. The excess glycol from overspray or drips from the plane lands on the ground and is washed away with the storm water. The glycol is usually diluted glycol and it is typically stored in a 55-gallon drum. The application to the plane is performed by a spray applicator and is pumped from the drum. The diluted glycol drum may be on its own mobile platform, a fixed barrel and/or on a vehicle. The location where the mixing occurs and the handling of full-strength glycol and diluted glycol must be addressed in the Plan. The following are BMPs that should be considered for implementation in handling bulk glycol and the diluted mixture:

- Obtain Materials Safety Data Sheets (MSDS) on the glycol.
- Read and understand MSDSs before handling glycol.
- Store drums containing glycol and diluted glycol inside buildings.
- Load and unload glycol barrels inside buildings if possible.
- It is not possible to load and unload glycol barrels inside, load/unload glycol barrels as close to an inside storage area as possible.
- Mix glycol and water inside buildings or on a deicing pad.
- Identify where unloading/loading spills enter the storm sewer system.
- Prepare spill/release response plans for glycol.
- Conduct training sessions on spill/release response plans for glycol.

Aircraft safety concerns limit the available BMPs for deicing operations. Because the glycol has good deicing properties, dilution usually will not lower the BOD to an acceptable discharge level. Aircraft safety is the primary concern in glycol application rates; however, overapplication could be avoided by reviewing actual application rates required under specific weather conditions. Review

and training in applications required for safe aircraft operation would be considered a BMP related to deicing operations. Because of the high BOD of glycol and limitations on reduction of application rates due to safety concerns, capturing and/or treating the runoff from the deicing operations will most likely be the BMP that provides the most beneficial environmental result.

The structural BMPs considered for implementation in application of glycol to airplanes should consist of constructing one or more deicing pads which will capture and contain most of the glycol. The deicing pad should consist of a raised concrete area large enough to hold the airplane and the deicing vehicle/equipment. The deicing pad would be connected to an underground tank which would store the runoff from the deicing pad, consisting of glycol and precipitation.

To minimize the dilution of the glycols with precipitation, the pad should have snow removed prior to performing deicing operations. In addition, there should be a valve or diversion pipe to divert precipitation that occurs on the pad during non-deicing events. The discharge in the diversion pipe should contain essentially clean storm water. Because of the possibility that the diversion pipe could occasionally have some deicing materials in the flow, it should discharge into a constructed wetland which has the potential to reduce residue BOD.

Once the glycol is contained, there are a few ways to dispose of the material:

- recycle;
- discharge it into a sanitary sewer system; or
- provide treatment.

If glycol can be maintained at a concentration of approximately 15% or greater, it has the potential to be recycled. Minimizing the dilution of glycol with precipitation is the key to being able to recycle it. Cleaning snow/ice from the deicing pad prior to use and diverting clean storm water from the tank as soon as practical will minimize dilution of the glycol. If concentrations higher than 15% can be achieved, the glycol may have some value to recycling companies.

The glycol can generally be discharged into a public sanitary sewer system, but the area treatment plant should be contacted to evaluate volumes, concentrations and costs. On-site septic systems will not provide adequate treatment for glycol.

Treatment systems can be designed to chemically reduce the BOD of glycol. Another option for treatment would be constructing wetlands using peat and vegetation for BOD reduction.

"Treating" glycol accumulation by allowing it to evaporate is not considered a BMP, since:

- evaporated glycol is an air pollutant;
- some residue from the glycol solution can still remain on the ground, contributing to stormwater pollution; and
- glycol is commonly applied during periods of precipitation, so it does not get a chance to evaporate.

For all the above reasons, provisions for collecting and treating glycol should be considered for inclusion in BMPs for airport facilities.