Water Quality and Professional Lawn Care

NC STATE EXTENSION

Introduction

Lawns are ecosystems that affect surface and groundwater systems. Lawn grasses clean the environment by absorbing gaseous pollutants and intercepting pesticides, fertilizers, dust, and sediment. Irrigation water that is properly applied to lawns remains on site and recharges groundwater. In addition, grasses release oxygen and reduce glare, noise, and summer temperatures.

The need to protect groundwater and surface water quality is a serious environmental issue. Good landscape design can minimize erosion and runoff by incorporating buffers near streams, wetlands, and other fragile areas. Good landscape design also minimizes the development of gullies, the redirection of streams, and the unnecessary disruption of the natural landscape, especially around drainage ditches and stream banks.

Equally important, proper management practices need to be implemented to protect the environment. The purpose of this publication is to provide management strategies to preserve and protect water resources in lawn care settings.

Best Management Practices (BMPs)

Every lawn maintenance decision has an effect on the ecosystem of the site. Best management practices, or BMPs, are practices designed to maximize resources, while minimizing environmental risk. The BMPs cover important aspects of turfgrass management from the design of the area to its daily maintenance. This publication provides BMPs applicable to the creation, protection, and maintenance of a turfgrass ecosystem.

Turfgrass Selection

Turfgrass selection can have a large effect on water quality. Using planting material that is weed free can minimize future weed problems and herbicide applications. Well adapted, improved grasses require less fertilizer, pesticides, and water. Healthy lawns are better able to cope and recover from pest and environmental stresses.

Turfgrasses differ in performance and cultural requirements across locations and environments. Turfgrass selection should be based on existing environmental conditions (soil pH, soil type, soil moisture content, degree of sunlight, and topography), the areas intended purpose, and expected management intensity. Refer to Extension publication, *Carolina Lawns*, AG-69 for an updated list of grasses that perform best in your area or check with the local county Extension center.

Fertilizers

The primary objective of a fertilization program is to create an environment where nutrients are available to sustain healthy plant growth with minimal risk to water quality. Since nutrients are not always found in adequate supply in the soil, many turfgrasses require fertilization to meet the needs of the plant.

Improper fertilization can be detrimental to turfgrass health and can pose a risk to groundwater quality. The lawn care manager must have a working knowledge of how the plant uses nutrients and the fate of nutrients in the soil. With this information, a fertilization program that benefits the turf and minimizes risks to water quality can be implemented.

Nitrogen and Phosphorous

Nitrogen and phosphorus are macronutrients that are essential for turfgrass growth and development. However, these nutrients are also the most likely to affect water quality. Therefore, a nutrient management plan is critical to maintain the lawn and the environment.

Phosphorus is important in the establishment and rooting of plants. However, phosphorus can enter surface waters (lakes and ponds) through erosion and can cause undesirable algal blooms and abnormal growth of aquatic plants.

Nitrogen is required for optimal plant growth and is often associated with the green color in plants. However, excessive nitrogen can be detrimental to turfgrasses and the environment. In lawns, excessive nitrogen may increase the occurrence of disease, thatch accumulation, decreased tolerance to environmental stress, reduced wear tolerance, restricted root systems, and decreased recuperation potential. In surface water (lakes and ponds), excessive nitrogen can also cause the overstimulation of aquatic plants and algae, as well as depletion of oxygen (hypoxia). Nitrogen (specifically nitrate) can enter groundwater through leaching. Excessive nitrate levels in drinking water can cause methemoglobinemia, a blood disorder in which cells do not have enough oxygen (also known as blue baby syndrome) in babies or young animals.

Nitrogen Carriers

Nitrogen carriers can affect the degree of runoff or leaching. Nitrate (NO_3) has the highest potential to leach or run off. The likelihood of nitrogen runoff increases if the fertilizers are applied to frozen ground or steep slopes, at high rates, or before excessive rainfall or irrigation. Leaching is likely if the soil is saturated, has low organic matter, or is sandy. Other forms of nitrogen are less likely to be changed to NO_3 if the soil is finely textured or if organic matter is present.

Table 1 outlines the characteristics of commercially available nitrogen carriers. Generally, nitrogen sources are separated into quickly available and slowly available categories.

Quickly available, or soluble, nitrogen forms provoke a rapid response by the plant. Inorganic salts, such as ammonium sulfate, dissolve rapidly in soil water and quickly provide large amounts of plant available nitrogen. Urea is a quickly available, organic nitrogen source that is commonly applied in liquid or granular form. In the soil, several reactions occur that rapidly convert urea to plant available ammonium. However, there is potential for foliage burn, volatilization, or conversion of liquid chemicals to a vapor, and/or leaching under some environmental conditions.

Slow-release nitrogen sources such as urea-formaldehyde rely on chemical and/or microbial activity for release of plant available nitrogen. Some of the urea-formaldehyde products that are available as solutions or suspensions can be applied in liquid form. Sulfur coated and polymer coated urea rely on coatings to control the release of plant available nitrogen into the soil solution.

Natural organic nitrogen sources are slowly available nitrogen sources derived from processed municipal sewage sludge, composted plant debris or animal products, and various other organic wastes. Plant available nitrogen is released from these products through chemical and microbial activity in the soil. As a result, temperature and moisture are important factors that govern microbial action and the release of plant available nitrogen. Warm moist conditions favor high levels of microbial activity and accelerate nitrogen release.

Overall, slowly available nitrogen sources provide a more controlled release of nitrogen, have longer residuals, and are less likely to leach than quickly available nitrogen fertilizers.

Table 1: Characteristics of nitrogen carriers

Fertilizer Type	Fertilizer Source	Nitrogen % Content	Leaching Potential	Burn Potential	Low Temperature Response	Resid Effect
Quickly Available, ***Inorganic***	Ammonium Nitrate	33–34	High	High	Rapid	Short
	Calcium Nitrate	16	High	High	Moderate	Short
	Ammonium Sulfate	21	Moderate	High	Rapid	Short
Quickly Available, ***Organic***	Urea	45–46	Moderate	Moderate	Rapid	Short
Slowly Available, ***Slowly Soluble***	1,1-diureido isobutane (IBDU)	31	Moderately Low	Low	Moderate	Moder
	Urea-formaldehyde	38	Low	Low	Very Low	Mode to Lo
Slowly Available, ***Slow Release***	Sulfur Coated Urea	31–38	Low	Low	Moderate	Moder
	Polymer Coated Urea	39–44	Low	Low	Low	Moder
Natural Organics	Sewage sludge	6	Very Low	Very Low	Very Low	Long
	Other natural products	3–10	Very Low	Very Low	Very Low	Long

Fertilizer Management BMPs

Base fertilizer applications on soil test results. A soil test will show the levels of nutrients in the soil. Most newly planted areas should be tested during the construction phase and subsequently every one to two years, depending on the type of turfgrass being grown.

- Wait a minimum of three to four weeks after fertilizing before sampling.
- Make sure sampling equipment is clean and free of contaminants. Clean equipment between samples.
- Submit a sample for analysis that is truly representative of the area.Sample to a uniform depth —preferably to 3 or 4 in.
- Take 15 to 20 soil cores from each area being tested by using a one in. diameter soil probe. Thoroughly mix them in a plastic container or paper bag. Do not use a metal bucket, which may affect results.
- It may take several weeks before receiving soil test results, so it is best to submit samples well in advance of fertilizing.
- Submit samples to a reputable laboratory for testing and interpretation. The North Carolina Department of Agriculture & Consumer Services provides soil testing. Submit samples to the Agronomic Division—NCDA&CS, 4300 Reedy Creek Road, Raleigh, NC 27607. In some

counties, the Cooperative Extension office may transfer samples to the NCDA&CS laboratory for you.

Supplement the soil test with a plant tissue analysis. A plant tissue analysis is a diagnostic tool that measures the concentrations of different nutrients in turfgrass leaf tissue. This analysis can be used to identify potential nutrient problems. For more information, visit NC Department of Agriculture & Consumer Services—Plant Tissue Analysis or contact your N.C. Cooperative Extension center.

Core or aerify compacted soil. Aerifying before fertilization can help fertilizer penetrate the soil. This is especially important for phosphorus. Coring, in which a machine aerator removes plugs or cores of soil from the lawn, on compacted, sloped areas will also reduce runoff.

Minimize fertilizer rates on slopes. High application rates of nitrogen and phosphorus fertilizer on slopes near surface water increases the risk of runoff. To minimize runoff risk, apply nitrogen rates between 0.25 and 0.50 lb per 1,000 sq ft per application to slopes.

Do not apply fertilizers directly into lakes, drainage areas, and other bodies of water. Maintain a buffer zone of low-maintenance grasses or natural vegetation between areas of highly maintained turf and water. Buffers create a filter for unwanted nutrients and sediments.

Consider using iron as a supplement to nitrogen for a greening response. Iron can be used alone or in combination with nitrogen to improve turf color. Decreasing nitrogen rates and the number of applications will decrease the possibility of nitrate leaching. Iron rates will vary with grass type and environmental conditions. Follow label directions.

Use slowly available nitrogen carriers on sandy soils. The risk of nitrate leaching and groundwater contamination increases in sandy soils. Slow-release nitrogen sources are less likely to leach below the root zone than soluble sources in highly leachable soils.

When applying soluble nitrogen to sandy soils with little organic matter and/or near shallow water tables, use nitrogen rates between 0.25 and 0.50 lb per 1,000 sq ft per application to limit leaching potential. Plant response to nitrogen is often better when lower levels are applied more frequently.

Time applications carefully. Quick release nitrogen sources should not be applied before a heavy rainfall or irrigation. Cold soil temperatures (lower than 55 degrees Fahrenheit) slow metabolic activity of soil microbes and decrease plant uptake of nitrogen. Therefore, nitrogen has the greatest chance of leaching in cool and wet weather.

Irrigate after each application of soluble fertilizer. Irrigating with 0.25 to 0.50 in. of water moves fertilizer from foliage and into the soil where it can be used by the plants. Irrigation decreases fertilizer loss through runoff and volatilization (vaporization), and minimizes the risk of foliar, or leaf burn.

Recycle grass clippings (grasscycling). When possible, leave grass clippings on the lawn to decompose and recycle nutrients back into the turf. This is “grasscycling.” Every 100 lb of dried

grass clippings contains approximately 4 lb of nitrogen, ½ lb of phosphorus, and 2 lb of potassium. Grasscycling may reduce fertilization requirements by 25%. Clippings that are removed should not be blown into bodies of water or placed in ditches or concrete areas where runoff is likely.

Use a drop (gravity) spreader near bodies of water or impermeable surfaces. Centrifugal (rotary) spreaders should not be used near bodies of water because of the potential of direct fertilizer contamination. Fertilizer granules should be removed (blown or swept) from impermeable surfaces such as roads and sidewalks to decrease the runoff potential. Drop spreaders may be used around bodies of water and impermeable surfaces to decrease the risk of runoff potential and direct contamination.

Irrigation

Determining the appropriate amount of irrigation is vital to the health of the turfgrass and the preservation of water quality. Temperature, wind, relative humidity, and soil moisture determine the use of water by the plant.

Irrigate to replace water lost through evapotranspiration, which is evaporation from land surfaces and plant leaves. Insufficient irrigation can cause turfgrass wilt and death. Over-irrigating increases nutrient leaching and runoff potential. Over-irrigating can also increase environmental stress and pest pressure of turfgrasses. For more information on irrigation and irrigation scheduling, refer to Extension publication *Water Requirements of North Carolina Turfgrasses*.

A properly designed and installed irrigation system will apply a uniform level of water at the desired rate and time. The amount and frequency of irrigation should be based on the needs of the grass, soil conditions, and the expected weather conditions. Water to just below the existing root zone to encourage deeper rooting. Deeper watering does not benefit the plant and may leach contaminants into the groundwater.

In those situations where homeowners are responsible for irrigation, the following BMPs will help protect water quality.

Irrigation BMPs (for homeowners)

- Water to a depth just below the root system. If you observe runoff, stop irrigating and wait for the existing water to enter the soil. Resume irrigating until the water reaches the appropriate depth.
- Do not irrigate until you see visual signs of wilt: purple colored patches of turf and/or “footprinting.” A soil probe can aid in the visual estimate of moisture content.
- Sloped areas and compacted soils should be irrigated in short, frequent intervals to minimize runoff. Sandy soils will need to be irrigated in short intervals to minimize leaching potential.
- Water in the early morning to increase irrigation efficiency and to decrease disease potential. Avoid midafternoon watering to reduce irrigation loss from evaporation and the amount of time when the turfgrass surface is moist.

- Do not be alarmed at brown, withered leaves that result from drought. These are normal signs of dormancy in cool-season grasses. Lawns allowed to go dormant should be watered every three weeks in the absence of rainfall to prevent temperature and drought injury.
- Do not irrigate before heavy traffic. Heavy traffic on a wet soil leads to soil compaction, which may then lead to runoff. Instead, irrigate two days before heavy traffic (in the absence of rainfall).
- Periodically conduct an irrigation audit to check the irrigation system's distribution uniformity. The Extension publication, *Landscape Irrigation Auditing Made Simple*, provides good information about managing irrigation systems.

Mowing

Maintaining the appropriate grass height encourages deeper roots, decreases weed pressure, and cools the surface of the lawn. Thatch is a layer of partially decomposed organic matter above the soil surface. This layer can be effective in capturing and breaking down pesticides. However, thatch ≥0.5 in. in thickness can be detrimental to a lawn's health by creating a favorable environment for turfgrass pests (insects and pathogens). Thatch can be reduced by vertical mowing, coring, and topdressing, which involves spreading a thin layer of material such as compost over the grass.

Mowing BMPs

- Use the highest acceptable mowing height for the grasses being grown. See Table 2.
- Never remove more than ⅓ of the leaf surface at one time. When prolonged rains make it impossible to mow regularly, raise the height of cut for the initial mowing and gradually return to the proper height over multiple days to weeks.
- Do not mow when grass is excessively wet to limit the formation of unsightly clumps of clippings and soil compaction.
- Leave grass clippings on the lawn to recycle nutrients (grasscycling) and decrease yard waste in landfills.
- Compost grass clippings if you cannot leave them on the turf. Composted grass clippings, as well as other yard waste, can be used as a soil conditioner. The "Composting" chapter in the *North Carolina Extension Gardener Handbook*, provides more information about composting yard materials.

Table 2. Guidelines for mowing heights.

Lawngrass	Height after Mowing (inches)
Bermudagrass	¾ to 2
Zoysiagrass	¾ to 2
Centipedegrass	1 to 2
Kentucky bluegrass, fine fescue, or perennial ryegrass	1½ to 3
Tall fescue	2½ to 3½

Integrated Pest Management (IPM) Program

An Integrated Pest Management (IPM) program uses all available methods to keep pests at acceptable levels, while minimizing negative effects on people, the environment, and the turf. The diverse IPM options include genetic, regulatory, physical, biological, cultural, and chemical (pesticide) solutions. However, a reduced reliance on pesticides is an important factor in IPM programs and the management of sites for water quality. A sound IPM program includes:

- **A Knowledgeable Manager.** Knowledge is the cornerstone of any successful IPM program. Know the grasses being grown, the likely pests, and the conditions that affect both.
- **Define Pest Threshold Levels.** Pest threshold levels - the degree of acceptable injury from pests - should be defined for each site. Examples include if weeds should be allowed in low maintenance settings or the number of insects that can tolerated per square foot.
- **A Written Plan.** This plan should include objectives for each section of the lawn. Each site should have specific management practices including non-chemical and chemical control measures.
- **Implement Appropriate Cultural Practices. Use of agronomically sound cultural practices** —such as rotating crops, sanitizing and solarizing the soil, adjusting sowing and harvesting times, reducing and disrupting pest habitats near crops, intercropping with aromatic herbs, and reducing weed seed sources—results in a healthy, dense turf that is better able to resist environmental and pest pressures.
- **Monitor Pest Activity.** Most pests are easier to manage when they are immature and few in number. Frequent scouting can help determine when pest activity or injury is in its initial stages, and when control is necessary.

- **Maintain Accurate Records.** Keeping accurate and up-to-date records of pest activity, actions taken, and the results of those actions will help in future planning and may limit legal liability.

Pesticide Selection and Use

Although pesticides are sometimes necessary to keep pests at tolerable levels, sole reliance on chemical control can no longer be justified. Rising chemical costs, increased resistance to pesticides, and environmental concerns discourage the exclusive use of pesticides.

Some criteria for selecting pesticides include the pest to be controlled, the pest's growth stage, the affected turfgrass species, the desired level of control, the required application method, the duration of control, and the possibility of environmental contamination. For effective management, consider all these factors.

Lawn care managers should frequently rotate between different pesticide modes of action to decrease the risk of developing pesticide resistance.

After all the factors mentioned above are considered and the options are narrowed, the pesticide leaching potential rating (PLP) should be considered to minimize the likelihood of leaching. See Tables 3, 4, and 5 for the PLPs of commonly applied pesticides. A pesticide with a low rating is very unlikely to move into groundwater or surface waters, while a pesticide with a high rating may be easily leached into groundwater.

The PLP values in the following tables are based on the soil retention, persistence, rate of application, and percentage of pesticide reaching the soil. Be aware that the PLP ratings may change from site to site depending on the microbial decomposition, soil pH, soil type, photodecomposition (degradation from sunlight), volatilization (changing of solids and liquids into gasses), and water volumes applied after pesticide application.

Finally, be sure to read and understand the pesticide label. Precautions (beyond leaching) are mentioned on the label. Pesticides currently available for use on agricultural, turfgrass, horticultural, and residential pests in North Carolina have been thoroughly tested by the pesticide manufacturer and approved by the Environmental Protection Agency (EPA) before their registration and release to the public. Pesticide applicators should be aware that the pesticide label is an official, binding contract between the chemical manufacturer, the EPA, and the purchaser of the product. If the label directions are not followed, the applicator may be subject to prosecution that results in penalties that may include fines and imprisonment.

Pesticide Selection and Use BMPs

- Plant turfgrass species and varieties that are insect and disease resistant when available.
- Use pesticides that have a low pesticide leaching potential (PLP) index, when possible.
- See Tables 3-5 for pesticides labeled for use on North Carolina turfgrasses. Rates of pesticides applied are based on the maximum reported application rates in Extension publication, *Pest*

Control for Professional Turfgrass Managers, AG-408. The pesticide leaching potential (PLP) index was computed with formulas defined in 1994 by R.L. Warren and J.B. Weber in *Evaluating Pesticide Movement in North Carolina Soils* (Warren, R. L. and Weber, J. B. 1994. Evaluating Pesticide Movement in North Carolina Soils. *Proc. Soil Sci*. *North Carolina* 37, 31–41).
Trade names listed are examples. Pesticides may be sold under other trade names.

- Develop and implement a quality IPM program.
- Train employees in proper pesticide application techniques.
- Determine the size of the area of application and mix only the quantity of pesticide needed in order to protect lawns, save money, and avoid disposal of unused material.
- Spot treat whenever possible.
- Read and follow all label directions. The label is a legal document.
- Only apply pesticides labeled for the turfgrass being grown and for the area being treated.
- Apply the pesticide correctly at the right time.
- Note groundwater advisories on the label.
- Mix pesticides and load spreader or sprayer carefully to avoid spills.
- Mix pesticides in areas where spills can be safely contained.
- Do not mix, apply, or dispose of chemicals within 100 feet of a well.
- Consider closed systems for loading and mixing.
- Triple-rinse containers, pour rinsate (the rinse water that is contaminated with low level of pesticides) into tank, and spray excess on an appropriate turfgrass area. Do not exceed label rates.
- Calibrate your spreader or sprayer. Refer to information provided with your equipment and to Extension publication, *Water Quality and Sprayer/Spreader Calibration*, for complete calibration instructions.
- Fill the spray tank away from a well or any body of water.
- Prevent back siphoning by keeping the fill hose above the solution level of the spray tank. Use an anti-backflow device or check valve on the fill hose.
- Store all pesticides in properly built and maintained storage facilities.

Pesticide Leaching Potential Indices

Table 3. Herbicides.

Common Name	Trade Name	Index*
Topramezone	Pylex	1
Glufosinate	Finale	8
Metsulfuron	Blade, Manor, MSM	16
Pendimethalin	Pre-M	20
Glyphosate	Roundup	20
Trifloxysulfuron	Monument	21
Fenoxaprop	Acclaim	24
Carfentrazone	Aim, QuickSilver	26
Prodiamine	Barricade	28
Sethoxydim	Segment	29
Fluazifop	Fusilade II	30
Benefin	Balan	31
MSMA	MSMA	35
Mesotrione	Tenacity	39
Oxadiazon	Ronstar	39
Imazaquin	Image	44
2,4-D	2,4-D	45
Bispyribac-sodium	Velocity	45
Dithiopyr	Dimension	45
Clopyralid	Lontrel	46
Asulam	Asulox	47

Common Name	Trade Name	Index*
DCPA	Dacthal	47
Quinclorac	Quinclorac, Drive	47
Bentazon	Basagran	48
Pronamide	Kerb	48
Dicamba	Banvel, Topeka	49
Imazapic	Plateau	49
Diclofop-methyl	Illoxan	50
Ethofumasate	Prograss, PoaConstrictor	52
Metribuzin	Sencor	52
Napropamide	Devrinol	52
Triclopyr	Turflon	54
Atrazine	AAtrex	56
Bensulide	Betasan	57
Mecoprop	MCPP	58
Simazine	Princep	62
Metolachlor	Pennant	63
Siduron	Tupersan	63
Imazapyr	Pursuit, others	65

* Pesticide Leaching Potential (PLP) Index (0 - 100) where 0 = very low leaching potential and 100 = very high leaching potential.

Table 4. Fungicides.

Common Name	Trade Name	Index*
Trifloxystrobin	Compass	8
Fosetyl-Al	Signature	9
Etridiazole	Koban, Terrazole	17
Propamocarb	Banol	17
Vinclozolin	Curlan	18
Iprodione	26GT	27
Tebuconazole	Torque, Mirage Stressgard	27
Propiconazole	Banner	30
Myclobutanil	Eagle, Siskin, Myclobutanil	32
Chlorothalonil	Daconil	33
Mancozeb	Fore	38
Thiophanate-methyl	Clearys 3336	41
Azoxystrobin	Heritage, Strobe	42
Mefenoxam	Subdue	59

* Pesticide Leaching Potential (PLP) Index (0 - 100) where 0 = very low leaching potential and 100 = very high leaching potential.

Table 5. Insecticides.

Common Name	Trade Name	Index*
Bifenthrin	Menace, Telstar, others	0
Cyfluthrin	Tempo	0
Cypermethrin	Demon	0
Hydramethylnon	Amdro, Maxforce	0
Lambda-Cyhalothrin	Battle, Scimitar, Cyonara	0
Permethrin	Astro	0
Deltamethrin	Deltagard	1
Imidacloprid	Merit	1
Indoxacarb	Advion, Provaunt	4
Spinosad	Conserve	11
Thiamethoxam	Meridian	12
Chlorpyrifos	Dursban	27, 30
Carbaryl	Sevin	37
Trichlorfon	Dylox, Proxol	38
Acephate	Orthene	52

* Pesticide Leaching Potential (PLP) Index (0 - 100) where 0 = very low leaching potential and 100 = very high leaching potential.

Pesticide Storage and Disposal

The best way to manage pesticide storage and disposal is to reduce the amount of pesticides that remain after applications by proper planning and equipment calibration. Faulty or improperly managed storage facilities may result in direct runoff or leaching of pesticides into surface and groundwaters. You and others may be held liable for damages suffered from improperly stored or

disposed of pesticides.

A good storage facility should possess the following features:

- A secure area where unauthorized persons are restricted from entering
- Proper signage such as *No Smoking* and *Warning Pesticide Storage* signs
- Limited opportunity for water damage
- Temperature control
- A location at least 50 ft from any body of water or stream where possible water damage is limited
- Nonporous floors
- Materials and equipment to contain and cleanup pesticide spills.
- Adequate lighting and ventilation
- Capability of containing runoff from spills
- Source for clean water
- Absence of combustible materials or debris

Pesticide Storage and Disposal BMPs

- Maintain and follow labels on all pesticide containers.
- Store pesticides only in original containers or make sure the new container is properly labeled.
- Store similar pesticides together. For example, store herbicides with herbicides and fungicides with fungicides.
- Keep containers closed tightly.
- Watch for damaged containers.
- Store pesticides which may be flammable separately.
- Maintain an up-to-date inventory of pesticides.
- Purchase only the amount you need.
- Comply with Emergency Planning and Right-to-Know regulations.
- Triple-rinse empty containers and puncture, crush, and recycle them. You can also take them to a landfill.
- Apply the rinsate to a labeled site at no more than labeled rates, or save the rinsate and use it as water for similar applications. Do not release rinsate in any uncontained areas.

Pesticide Spills

Unmanaged spills can quickly move into surface waters and cause injury to plants and animals. It is essential that lawn care managers be prepared for both major and minor spills.

Pesticide Spill BMPs

- Locate and control the source.
- For small spills, use kitty litter, vermiculite, shredded newspaper, or adsorbent pillows or pads. Direct large spills away from ditches, storm drains, ponds, or wells via dikes.
- Place contaminated material in plastic container(s) for disposal.
- Encourage employees to report spills as soon as possible.
- Call Chemtrec, a 24-hour emergency service for spill management and specific instructions for onsite neutralization (800-262-8200).

Storage Tanks

Underground storage tanks are frequently used for petroleum storage. A leaking underground storage tank represents a fire and explosion hazard, as well as a fume hazard, and a serious threat to groundwater. Environmental contamination of groundwater with hydrocarbons increases the potential exposure to benzene and ethyl dibromide, which are suspected cancer causing agents.

Piping failure, spills and overfills, and tank corrosion are the main causes of leaks from underground storage tanks. The EPA estimated that 80% of all spills are the result of failure or fatigue of piping systems. Many of these failures were caused by improper installation and maintenance. The corrosion of tank walls and the failure of fiberglass reinforced tanks are other leading causes.

An aboveground storage tank with containment walls is the preferred method of storing chemicals. For more information, contact your local fire marshal.

Given the difficulty and the cost of cleanup, underground storage tanks at the site should be monitored closely. Specific preventative measures include installation of double-walled tanks, early detection of leaks, inventory control, monitoring, and tightness testing, an analytic method that determines if a tank leaks.

Water quality should be considered at all stages of lawn care. Factors to consider have been outlined in this publication to help protect water quality—one of our most precious resources.

Additional Resource

Pesticide Leaching Potential

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