CUTT

Point Source Pollution Prevention

A Healthy Ecosystem

The maintenance facility is one of the most important components of the turfgrass operation. Neglecting the importance of the maintenance area reduces workforce efficiency and may have environmental consequences.

The maintenance facility (barn, shop, turf care center, etc.) is the center of activity for a turf operation. Many consider the facility simply a storage area for equipment staging and maintenance, equipment cleaning, pesticide and fertilizer storage, and personnel offices and lockers.

"The maintenance facility," says Keith Happ, USGA MidAtlantic Regional Agronomist, "is one of the most important components of the turfgrass operation." It is surprising that at many facilities the maintenance area is an afterthought. Neglecting the importance of the maintenance area reduces workforce efficiency and may have environmental consequences.

Public concern for the use of pesticides and fertilizers typically focuses on the application to turf. It seems odd that the application of a one to five percent chemical solution draws more attention than the handling of the concentrated product. In fact, very few states have strict regulations for the storage and handling of pesticides and fertilizers at maintenance facilities where bulk material is not stored.

Point Source

Chemicals arrive at large bodies of water (surface or subsurface) through two major processes. Where the direct source of the input is not easily identified (non-point source pollution), or through the direct discharge of a pollutant into a water body, such as a pipe directly discharging into a stream (point source pollution).

Non-point source pollution is difficult to quantify and identify a particular pollutant. For example, when making a pesticide application to a lawn or golf fairway, it might be difficult to know where to find the chemical or which treatment actually caused the pollution. Within non-point source pollution, the two transport processes are downward movement through the soil profile (leaching) or surface movement (runoff).

Point source pollution at turfgrass facilities can be the result of accidental spills of chemical concentrate, improperly contained pesticide management facilities (storage, mixing, rinsing, etc.), equipment washing areas, or subsurface drainage systems that discharge directly into surface water bodies. Many of these activities are centered at the maintenance facility and can be addressed with proper planning and design.

Plan to Prevent

The location of the maintenance facility may have been dictated by land that would not be used for other purposes. There may not have been practical consideration to the ingress and egress of delivery vehicles or for the need to efficiently complete tasks in construction of a new golf course.

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Storage facilities should have impervious flooring, either poured concrete or steel, and be kept locked at all times. The building should have good ventilation, shelving should be non-wooden and all light fixtures should be explosion proof. Solid materials should always be stored above liquids and absorbent floor sweep materials should be on hand for spills.

From an environmental perspective, was there consideration for proximity to sensitive areas such as surface water bodies, wetlands or well heads? There might be instances when the most efficient working location will create environmental concerns. In this case, proper design could mitigate any problems.

There are practical considerations for designing a facility where equipment will be stored. The building should have plenty of floor storage space and wide, well positioned openings for efficient traffic flow. There are few things more frustrating than having to move three or four pieces of equipment to get to a necessary item.

The design of a building that secures environmental quality is focused on containment. Specifically, containment of all potential pollutants from soil and water and only allowing clean stormwater to be discharged onto the ground or into surface water bodies.

Chemical Containment

Containment begins with recognizing the potential pollutants around the maintenance facility. The obvious, fertilizer and pesticide storage, but also fuel storage, debris from equipment waste, and equipment lubricants and cleaners require specific containment. “Source prevention,” says Charles Peacock of North Carolina State University, “precludes the possibility of movement of sediment, nutrients or pesticides from the property or from toxic materials being introduced into ecologically sensitive areas.” This includes reducing the amount of material stored at the maintenance facility.

An effective Integrated Pest Management (IPM) program that establishes tolerances and action thresholds is the cornerstone for reducing storage requirements. For example, on fairway turf, chemical storage needs are reduced if no preventative controls are applied, some injury is tolerated, and only infected areas are spot treated.

The safe storage of chemicals requires the recognition that only persons trained to handle chemicals will be exposed. A recent survey of golf course best management practices (BMP) to protect water quality in the Northeast United States, conducted by Cornell University, found that 20% of the respondents stored chemicals in the maintenance building with other equipment and supplies. Thirty eight percent have a dedicated storage facility. This same survey revealed that 85% of pesticide and fertilizer storage and handling areas were greater than 100 feet from the nearest surface water body or well.

Storage facilities should have impervious flooring, either poured concrete or steel, and be kept locked at all times. The building should have good ventilation, with some states requiring that the air be capable of being changed 6 times per hour. Shelving should be non-wooden and all light fixtures should be explosion proof. Solid materials should always be stored above liquids and absorbent floor sweep materials should be on hand for spills.

An equipment washing facility.

Handle with Care

Once chemical handling begins, the risk to the environment increases exponentially. In recognition of this there has been some research conducted with direct injection spray units. First developed for agricultural applications, these units are designed to leave the concentrate in the original container and to carry a large tank of clean water. There are many benefits to this technology beyond reduced mixing risk that includes not having to carry and clean 100-200 gallons of pesticide solution, minimize product waste by using only the concentrate needed, and increased ease of spot treating.

Chemical handling areas can reduce environmental risk by having a poured concrete floor able to contain 120% of the largest volume container, a sump where rinsate and spills can be cleaned and recycled, and preferably be covered. Rinsate tanks should be placed on the containment pad. After a pesticide application, equipment should be triple rinsed—including the exterior—to remove chemical contaminants.

Equipment Washing

Regular equipment washing should not take place in the chemical containment area. For example, with a completely contained chemical area the collection of equipment debris would burden the sump and rinsate system not designed for particulate matter. A dedicated equipment washing area is also critical for environmental safety.

"The simple objective of the washing operation," says Greg Lyman, Turfgrass Environmental Education Specialist at Michigan State University, "is to remove clippings from the equipment so it's clean for the next use." Lyman continues, "While engine cleaning is not the target of the daily wash process, petroleum products can be dislodged from grease fittings, engines or hydraulic systems." As a result, nutrients in clippings, soil particles, and hydrocarbons from engine fluids can contaminate water bodies if not properly contained.

Equipment washing systems are not commonplace at most maintenance facilities. The Cornell University BMP survey found that only 13% of respondents had a filtration system associated with equipment washing. In fact, 60% of all respondents allow water to directly percolate into the soil, with no mention of how debris is managed. Interestingly, 45% of the respondents used compressed air to remove clippings from equipment before washing. In this case, the clippings and debris are easily collected and used for composting.

Equipment wash station systems include where the water is treated through specialized equipment and where the clippings are separated from the water so that the water can be discharged on-site. On-site closed loop systems are by far the most sophisticated and expensive treatment system available. This system recycles the wash water so that there is no discharge from the system. There are a variety of filter systems that can include ozone infusion and biological digestion. These systems trap and process petroleum products, nutrients and other organic waste.

Separation systems are less expensive than treatment systems, but because the water is not treated, the discharge needs to be more controlled. Also, more care must be taken to not remove engine fluids and grease into the wash water. A simple "dog leash" system requires that the equipment be washed on a turf area and regularly moved to avoid puddling and excess clipping accumulation. Also, catch and release systems capture the clippings with screening and then water is allowed to infiltrate either into the soil or discharged into a septic tank-like system. Regardless of the type of separation system, there should be no direct discharge of the wash water or clippings into surface water bodies.

Get Help!

A myriad of demands and expectations continues to force most golf course superintendents to seek expert advice on environmental quality issues. Many surveys indicate that a primary source of information is superintendent colleagues. This is a good place to start before embarking on building a maintenance facility to improve environmental protection.

Be sure consult with local planning officials as well as EPA personnel for any specific regulations. Next, programs such as Audubon International and the Michigan Environmental Stewardship Program can provide suggestions for facilities looking to upgrade. This will lead to further interaction with superintendents about what works and doesn't. Protecting the environment from point source pollution around the maintenance facility does not have to cost more, nor compromise function.

Frank S. Rossi

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Equipment washing and engine cleaning can result in clippings, soil particles, and hydrocarbons from engine fluids contaminating water bodies if not properly contained.

A myriad of demands and expectations continues to force most golf course superintendents to seek expert advice on environmental quality issues. A primary source of information is superintendent colleagues. Also consult with local planning officials as well as EPA personnel for any specific regulations. Programs such as Audubon International and the Michigan Environmental Stewardship Program can help. Protecting the environment from point source pollution around the maintenance facility does not have to cost more, nor compromise function.