

Integrated Chemical Management[™]

For

Golf Course Maintenance Facilities

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An innovative concept for golf course maintenance operations; chemical management, fueling, and vehicle washing operations are combined in one integrated system for collection, recycle and treatment of all discharges. Through the use of Best Available Technology, zero discharge of pollutants can be achieved.

SUMMARY

There is a growing awareness of the potential environmental impacts and liabilities related to vehicle washing, sprayer chemical handling and vehicle refueling operations. Therefore, the design of a maintenance facility should minimize these impacts while simplifying maintenance operations. These issues are regularly addressed during the siting of new courses or during the expansion or renovation of existing facilities.

An innovative approach for golf course maintenance facilities places the fueling, chemical management and equipment washing operations within one containment area. This containment area is supported by state-of-the-art chemical mix and advanced wastewater recycle systems to achieve "zero discharge" of pollutants.

THE INTEGRATED APPROACH

Recently Carbtrol Corp. and PlantStar, Inc. have joined to develop a process to integrate the chemical management operations at golf course maintenance facilities. The cornerstone of this process is a state-of-the-art PlantStar chemical mixing and handling system coupled with a Carbtrol advanced washwater treatment and recycle system. Together these system provide the technology necessary to eliminate all toxic chemical discharges.

Implementation of the integrated chemical management[™] concept involves the arrangement of the physical plant (buildings, pads, etc.) in a manner so as to provide a containment envelope for all wash, chemical handling and fueling processes. Any fuels, chemicals, sprayer solutions, or wash waters released within the containment envelope are captured, segregated, and either recycled or treated so as to prevent release to the environment.

In a preferred layout (see attached), separate areas are provided for chemical storage, chemical mixing, sprayer storage, vehicle wash, and fueling operations. Each of these areas is diked or sloped such that any spills, leaks, or wash waters drain to appropriate collection sumps for further processing.

CHEMICAL STORAGE, MIXING AND HANDLING

Chemical storage, mixing and handling operations are supported by a state-of-the-art PlantStar Chemical Mixing System. This includes equipment for the preparation of the various chemical sprayer batches, and for transfer of the chemical solutions from the mix area to individual sprayer

application tanks. A 360-gallon open-top chemical mix tank, a 540-gallon closed-top storage tank, and a high-capacity self-priming pumping station provides the capability to agitate chemical solutions and to rapidly fill sprayer tanks through the use of 2" flex hose fitted with quick-connect couplings. The system is configured so as to minimize worker exposure while maximizing mixing and loading efficiency. Provision is made for mixing chemical batches with cold potable, hot potable, or treated recycle water.

An associated sump collection and recycle system enables any spills in the chemical mixing, chemical storage, or sprayer storage areas to be pumped back to either of the chemical mix tanks for reuse. Water from wash down of the sprayer area or from sprayer nozzle calibration can also be directed back to the chemical mix tanks or to the Advanced Washwater Recycle System where appropriate.

VEHICLE FUELING AND WASHING

A Carbtrol Advanced Washwater Recycle System is provided to treat wastewater generated in vehicle washing and to process any spills or leaks from vehicle fueling or chemical mixing operations. Once treated, the water is recycled back for vehicle washing, thus effectively eliminating any discharge. The Carbtrol system removes grass, dirt, and other solids, as well as any petroleum hydrocarbons, pesticides, herbicides or other toxic chemicals from the wastewater. The system utilizes granular activated carbon adsorption technology together with an advanced chemical oxidation process to provide the highest level of organic chemical treatment (Best Available Technology).

The Carbtrol treatment and recycle system is capable of providing a sustained flow rate of 30 gpm (max

40,000 gpd) to the vehicle washing operation. The recycled water is provided on demand, and in sufficient quantity to meet the most aggressive wash requirements. Unlike most biological processes, the system is not affected by temperature swings, shock loads, or changes in pH or other water chemistry. The system will produce a uniform water quality despite variable conditions or unexpected spills. The objective of the Carbtrol system is to achieve zero discharge of pollutants.

Vehicle fueling and washing operations are accomplished on a covered pad(s) where all wash water and any fueling spills and leaks drain to an agitated central collection sump. The wastewater is then processed by screening and clarification for solids removal prior to treatment in the adsorption/advanced oxidation process. A compressed air pre-clean blow off station is provided to reduce the amount of grass and debris handled. An ozonation system is supplied to ensure that there are no odors.

COSTS AND OPERATING CONSIDERATIONS

While the concept of integrated chemical management[™] represents a change from the traditional approach to golf maintenance facility design, it can be viewed as a reorganization and consolidation of activities that would otherwise be separately provided. It has been shown in many cases that chemical management integration can be accomplished for the same or lower cost than traditional facility development.

An added benefit of the concept is a more efficient layout of the fueling, wash, and chemical handling operations. The integrated design promotes a smooth and timely vehicle and operating work flow, and can reduce equipment and personnel downtime.

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SUMMARY OF ADVANTAGES

Fast Track Permitting – Recycling of washwater reduces complications with permits for discharge.

Reduced Liability – Positive chemical containment and treatment eliminates the potential liability related to uncontrolled chemical release.

Reduced Personnel Exposure - State of the art chemical mix/handling system significantly reduces personnel exposure to toxic chemicals.

Best Available Technology – The use of granular activated carbon adsorption and advanced chemical oxidation represents the best available technology for treatment of toxic organic chemicals.

Low Maintenance – The PlantStar Chemical Mix System and the Carbtrol Advanced Washwater Recycle System are designed for simplicity of operation and ease of maintenance.

Secure Chemical and Sprayer Storage – Controlled access to chemical mix, chemical storage, and sprayer storage minimizes the potential for vandalism.

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INTEGRATED CHEMICAL MANAGEMENT™ SYSTEM

