



**Guidelines for Building  
Environmentally Safe and  
Site Appropriate Golf Courses  
in Teton County, Wyoming**

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# Executive Summary

## Background

The following was inspired by the realization that proposals for six new golf courses may soon be reviewed by the Town of Jackson or Teton County Planning Departments. Six new proposals could mean development on nearly seven percent (a conservative estimate) of the total remaining developable land in Teton County.

The Teton County Planning Department, recognizing that they are not equipped to review such projects under the existing Land Development Regulations (LDRs), has been working on a text amendment to the LDRs that would provide regulations governing the future design, operation and management of golf courses in Teton County.

Given the potential for golf courses to contaminate water and pollute soils, the Jackson Hole Conservation Alliance believes that LDRs addressing golf course developments must include specific guidelines to protect Teton County's natural environment. We refer to such guidelines as a "Natural Resource Management Plan" (NRMP). A comprehensive NRMP is an essential component of future golf course regulations. A comprehensive NRMP clarifies the role of developers and their responsibility to the community and the environment, and assures the community that the environment will be protected in the face of golf course development.

## Purpose

This report has been conducted on the premise that it is possible to design economically viable golf courses that minimize environmental impacts, restore degraded habitats and incorporate environmentally sensitive areas in appropriate ways.

It is intended to provide thorough and up-to-date information on golf course designs for people trying to effectively participate in the evaluation of golf course applications in Teton County. The purpose of this paper is to strengthen our understanding of golf course design, construction, operation and maintenance. The following is a collection and summary of existing scientific information on the applied methodology and available technologies of environmentally sensitive golf course design and management.

## **Objectives**

The intent of this paper is to expand technical knowledge of golf course development and to provide appropriate guidelines for building environmentally sensitive and site appropriate golf courses in Teton County. We expect that this document will serve as a general reference for future developers and planners in their preparation of a Natural Resource Management Plan.

## Section I: Approach

There must be a demonstrated intent by the golf course developer to plan, develop and manage the golf course in the most site appropriate and environmentally responsible manner. The proposed project plan should incorporate the following objectives and procedures:

### **Objectives:**

- A commitment to golf course design, operation and management that is in compliance with the intent of the Comprehensive Plan and the stated objectives in the county's Land Development Regulations.
- A commitment to golf course operation and management that is in compliance with the existing impact and mitigation requirements as stated in federal, state and county regulations.
- The identification of the following site specific conditions: wildlife migration corridors and habitat, existing water quality conditions, jurisdictional and non jurisdictional wetlands, streams and creeks, riparian habitat, 10 and 100 year flood plains, Species of Special Concern, Natural Resource Overlay (NRO) and Scenic Resource Overlay (SRO) districts where applicable, old growth trees, rock formations, and other potential site resources of value. Each developer must demonstrate a conscious effort to plan a course that will have the least negative impact on the natural environment.
- The developer will, in consort with County approved experts (paid by the developer), create a site appropriate design which, to the maximum extent possible:
  - a. Preserves and enhances existing habitat and available forage for wildlife;
  - b. Creates a healthy turf grass environment and minimizes turf wear;
  - c. Avoids any identifiable risk to the surface or subsurface groundwater;
  - d. Employs an energy and resource efficient irrigation system that is operated in a way that sufficiently meets the turf grass requirement while preventing the runoff or leaching of unnecessary water, chemicals, fertilizers and pesticides;
  - e. Employs an appropriate drainage system for water collection and outflow. An approved course should use various biologically active biofilters to purify drainage discharge;
  - f. Offers a reduced pesticide use environment to visitors concerned with the real and suspected health hazards that are commonly associated with conventional golf course management. A commitment to use pesticides only as a last resort;
  - g. Develops and utilizes an integrated Natural Resource Management Plan (NRMP) that identifies and illustrates the principles and practices outlined above.

### **Applicable Procedures:**

The following is an outline of the steps and procedures to be used during planning, construction operation and maintenance in order to preserve and protect the quality and health of the environment shared by the golf course.

## Section 2: Turf grass

### 1. Best Management Practices: Strategies for Efficient Turf grass Management

- Select turf species that are appropriate for the varying conditions and functions that exist on the proposed course;
- Select turf species that are suited for the site and have the capability of stabilizing the site against erosion;
- Utilize organic based fertilizers to enhance and stimulate beneficial soil organisms. The active presence of organic based fertilizers reduces the potential for disease to impact turf grass;
- Choose products that will be the least likely to leach or drift;
- Utilize sound agronomic and horticultural management practices to minimize pesticide use. Whenever and wherever possible, choose the pesticides that are least persistent and least toxic to non target species;
- Utilize sound management practices and available environmental technology to acquire knowledge on the presence and control of pests;
- Limit impact to non target pests through spot treatments and management buffers.

### 2. Turf grass Selection Criteria

The following criteria must be used to determine the specific species of turf grass to be used on the proposed course:

- Climatological conditions of the site
- Resistance to annual grasses and weeds
- Water quality adaptability (i.e. chlorides, salt, boron, bicarbonates, etc.)
- Wear tolerance
- Resistance to disease and insects
- Drought tolerance
- Quality nursery sod and seed for course planting
- Quality, certified seed varieties that are free of weeds and pests. Seeds must be grown and harvested in accordance with sound turf growing practices

### 3. Fertility

The initial and periodic application of soil nutrients will create an optimum growing condition for the establishment and maintenance of healthy turf grass. This is vital to maintaining a turf grass stand that will be resistant to invasive weeds and withstand the impact of insects and diseases, reducing the need for pesticides and fertilizers. Furthermore, healthy turf has a higher degree of live bioactive tissue and thatch, allowing the turf to act as a living filter. This concept supports the reasons for the federal protection of wetlands and demonstrates the process by which reclaimed water plants process sewage. Microorganisms attack and digest sewage waste and take up nutrients, ultimately breaking down the chemicals found in waste into reduced soluble nutrients.

To select and create the best turf cover for the needs of specific areas at the proposed site, a developer must aim to:

- Create a healthy turf capable of resisting pest, disease, repair, and traffic pressures;
- Promote the enhancement of soil biology to facilitate pest and disease suppression;
- Protect and improve the physical properties of the soil to support the healthiest possible turf and microbial growth;
- Prevent nutrients from leaching or running off beyond the bioactive zone or target areas;
- Maximize the efficiency of applied fertilizers;
- Minimize the cost of fertilizers;
- Introduce and stimulate soil micro-organisms to augment the nutrient needs of the turf (“bio-fertility”) by:
  - a. Pulling nitrogen from the air and supplying it to the plants;
  - b. Managing nutrients to prevent their leaching beyond the active root zone;
  - c. Recycling nutrients from clippings and thatch;
  - d. Releasing existing nutrients bound in mineral and other insoluble soil components.

These goals may be achieved with the combined use of:

- Dry granular organic fertilizers (i.e. Sustane, Ringer);
- Dry granular synthetic fertilizers (water soluble and slow release);
- Foliar applications in micro amounts of synthetic soluble fertilizers, kelp extracts, trace elements, and biostimulants;
- Top dressing with high quality composts as part of routine maintenance in appropriate areas and with site tested and approved products;
- Introduction of beneficial micro flora in foliar and soil applications (biofertility agents);
- Utilization of beneficial liquid compost or other bioactive extracts.

#### **4. Cultural Control Program Outline**

The basic goal of cultural management is to maintain healthy turf thereby reducing the incidence of weeds, insects, nematodes, and diseases to the maximum extent possible. Below is an outline of the cultural practices expected for use on a proposed golf course:

- Proper pH and electrolytic balance of soils must be established and maintained in order to provide optimum growing conditions;
- A golf course superintendent should select USGA certified greens material and/or adhere to agronomically correct greens construction methodology;
- Air circulation, water relationship, and exposure to sunlight must be monitored during various stages of planning and construction. Where possible, areas under stress during normal operations will be improved;
- Surface and subsurface drainage will be established in order to reduce excessive water from accumulating on the playing surface or root zone;
- Cart and traffic flow must be regulated in order to reduce turf wear and establish appropriate levels for soil compaction;
- Adequate tee and green size must be established to minimize traffic wear and reduce areas of intense soil compaction;

- Appropriate and timely application of irrigation water;
- Misting, by means of the irrigation system, will be used to provide effective control over the rate of evapotranspiration and heat stress;
- Appropriate use of soil amendments (gypsum, sulfur, sulfuric acid, etc.) to maintain soil structure and drainage;
- Daily inspection by the golf course management team to identify potential pest problems.

## 5. Mechanical Control Program Outline

In conjunction with preventative cultural control measures, the addition of a mechanical control program will be needed to maintain a healthy and protective stand of turf grass for the course. These controls provide various ways to improve air, soil, and water quality in turf grass management. Suggested mechanical controls include the use of some or all of the following types of equipment and practices:

- I. Aerification;
- II. Dethatching (heavy thatch removal);
- III. Proper mowing techniques;
- IV. Proper equipment maintenance.

### I. Aerification

**Core aerification** is the process whereby the passageways connecting the turf cover and the root zone are opened. Since golf courses are subject to heavy traffic (walkers, carts, tractors, etc.), the upper soil has a tendency to compress (compaction) and create inadequate soil pore space. Often, this will restrict the passageway of air and water into the root zone. In agriculture, the equivalent of the aerification process is plowing and discing.

A reduction in the growth of turf grass may be due to an imbalance in the exchange of water, carbon dioxide, and oxygen. If the aerification method is performed too late in the summer, heat related stress may result. In addition, a delayed recovery may lead to weed infestation and insect invasions. Exposure of the root zone and soil/mix must be balanced with the effects of elevated or decreased temperature. Summer aerification with traditional core aerifiers will increase direct sun exposure along with elevated evapotranspiration values. This may result in desiccation, turf damage, and a plant more susceptible to disease or pest invasion.

Aerification should be performed in the late spring (April-June) and again in the early fall (September-October) in order to manage routine problems. If this method is performed too early in the spring or too late in the fall, a golf course may suffer from inactive turf recovery and/or adverse weed-seed competition.

Additional aerification will sometimes be used to alleviate a reduction in the root structure profile. Historically, **shatter core aerification** has been used when persistent compaction problems warrant deeper aerification. With shatter core aerification, the presence of soil/sand on the canopy of the leaf surface must be minimized.

The recent advent of **hydro-injection aerification** (high pressure water injection) provides an increased safety margin for aerification on greens and tees during summer months. Comparative field-testing is currently underway to determine the benefits of this form of aerification. One minor disadvantage from hydro-injection aerification is the disturbance of lower profile particle fines (e.g., the displacement of sand or gravel onto a putting green surface). It should be noted that no form of aerification is trouble free.

## **II. Dethatching**

The use of mechanical methods to control the excess build up of thatch is necessary to manage a healthy turf. Some thatch on playing surfaces is desirable because of its cushion and filtering effects. Thatch helps to shade and protect the soils, as well as to contain or filter fertilizers and chemicals. In addition, the proper amount of thatch will help to enhance the biological active zone. This, in turn, will help to deactivate undesirable residual chemical and fertilizer products. Dethatching, vertical mowing, sand top dressing, biological active enhancers, grooming, and brushing are the primary methods used to control and maintain the desired thatch level.

## **III. Proper Mowing Techniques**

No more than one third of the leaf blade should be routinely removed in any single mowing. Clippings should be removed from tees and greens and dispersed over the rough adjacent to each hole where they are removed. The compost of removed leaf blades and clippings should be removed from any intended area of play.

Consistent mowing heights and proper bed knife adjustments must be maintained throughout the growing season. Alternate mowing equipment used during periods of excessive soil wetness shall be used to maintain these consistent mowing heights. Mowing frequency will increase during the spring as well as one to three weeks after applying fertilizer. During cooler conditions and/or hot and dry periods, mowing frequency may decrease. During inclement weather, the golf course superintendent should use a reduction in mowing frequency in order to minimize surface water mechanical damage.

## **IV. Proper Equipment Maintenance**

Each mower should be adjusted, sharpened, and inspected according to the manufacturer's specification in order to provide optimum cutting performance. The use of Wiehle rollers should be included on all equipment used to mow tees, fairways, and greens. This will aid in the control of excess thatch while promoting the till of planted bent grass. All turf grass should be maintained at the highest cutting height possible to produce an acceptable playing surface.

## Section 3: Irrigation

### **Balance: The Key to Success**

To implement a balanced and environmentally compatible management program for a golf course, efficient and appropriate water applications and nutrient management must be achieved.

#### **Too Much**

Too much water can lead to soluble nutrients leaching beyond the root zone thereby predisposing the turf to fungi disease, soil compaction, weed invasion, etc. Too much nitrogen or other soluble nutrients can also lead to fungi related diseases, leaching, and excessive growth.

#### **Too Little**

On the other hand, the application of too little water results in tissue and cell damage due to desiccation and salt accumulation (concentration) further magnifying the impact of low soil moisture to turf. This predisposes the turf to damage from traffic and wear, disease, insect, and weed invasion. Imbalanced nutrients can result in a weakened plant, vulnerability to cart and equipment wear, dormant pathogens, weeds, and insects.

### **State-of-the-Art Irrigation**

A state-of-the-art irrigation system can:

- a. Calculate the evaporative loss that has occurred since the last irrigation cycle;
- b. Tell each sprinkler head how much water to apply to replace evaporative loss;
- c. Apply water at a rate that will prevent runoff;
- d. Regulate pressure at each head to get maximum uniformity of water distribution;
- e. Allow the field staff to make site adjustments to compensate for shade, slope, sun exposure (relief), etc.

### **Irrigation Components**

The proposed project should use the following irrigation components and criteria to develop a state-of-the-art irrigation system capable of applying water where it is needed and in the amount desired:

- a. On-site weather station;
- b. Central control irrigation system;
- c. Field control satellites;
- d. Valve-in-head sprinklers with pressure regulating valves;
- e. Valve control wire running from each head to the field control satellite.

The combined application of these technologies will help to both efficiently reapply water to match turf evapotranspiration and maintain a desirable moisture balance within the root zone of the turf areas. This in turn will help to avoid the leaching of excess fertilizers and pesticides.

## **Fertigation**

Fertigation is the use of a proportional injection system that adds necessary nutrients in small quantities to the irrigation water applied to the course. This approach reduces the chance of leaching and run off. Soil tests should be used to verify the type and quantity of nutrients needed. The immediate uptake of the necessary nutrients by plant and soil microbes will help to maintain a healthy turf.

A computer controlled boom sprayer can be used to apply all approved nutrient sprays and biocides.

## Section 4: Drainage

The golf course must be designed to capture or direct drainage water from the managed turf to biofilter areas for cleaning. This approach minimizes the potential for nutrient and pesticide discharge into environmentally sensitive areas.

Biofilter areas (including wet and dry grassed swales and/or sealed lakes) are designed to capture leachate. These areas should be designed to contain all associated runoff with an aesthetic value that requires little or no maintenance.

### **Biofilters & Recirculation:**

Best management practices (BMPs) to protect water quality are normally designed and engineered as part of a comprehensive erosion control plan. BMPs are easily implemented, affordable, and provide effective turf grass filtration for drainage or leachate. For example, drainage discharge water can be reintroduced to the atmosphere. The reintroduction of drainage water to sunlight, oxygen, biomatter, etc. works synergistically to adsorb (attach to the surface), absorb (drawn into the plant or organism), utilize, and biodegrade nutrients, heavy metals and pesticides before the water enters drainage discharge channels (biofiltration). Vegetative material (biofilters) can filter water prior to its discharge into drainage passageways.

Golf Ventures International identifies the following four categories of biofilters:

#### **I. Wet Biofilters:**

- Regulated Runoff Impoundment: Prior to discharge, this method is used to reduce runoff and nutrient/pesticide discharge. Discharge is filtered through plant material within the basin.
- Aquatic Filter Ponds: Nutrients and pesticides are filtered through ponds, basins or channels containing aquatic vegetation to filter or assimilate nutrients and pesticides from drainage water.

#### **II. Intermittent Biofilters:**

- Land Absorption Areas: An adequate land absorption area allows for drainage or runoff filtration so that soil and plants absorb nutrients and help to break down pesticides and their metabolites. All of the surface drainage from the golf course can be collected on-site for further filtration. All drainage from impervious surfaces is directed into areas that have vegetative cover. These will be designed to quickly absorb water to reduce ponding and consequently should reduce the likelihood of these areas becoming mosquito breeding grounds.
- Subsurface Drainage: Surface water, primarily from greens, will be filtered through vegetative material to reduce runoff and leaching from the golf course. These areas will be designed to limit standing water to short periods of saturation.

### **III. Dry Biofilters:**

- Critical Area Planting: Planting vegetation in critical areas stabilizes the soil and reduces erosion and runoff. Vegetation options that fulfill this purpose include turf grasses, native perennial grasses, and forbs.
- Grassed Waterway or Outlet: A natural or constructed waterway or outlet maintained with vegetative cover can prevent soil erosion and filter nutrients. Dry grassy swales, bunkers and golf course fairways work in this capacity.

### **IV. Green Under Drains:**

Trenches on greens shall be excavated in a herringbone or semi herringbone style with no lateral lines spaced more than 20 feet apart. Trenches should be eight inches wide and 12 inches deep. The bottom of the trench will produce a constant grade of not less than 0.5 per cent. The trenches and associated drain tile should extend to the drainage collection system. Trenches draining into the collection system will be vented to ensure a vacuum does not slow the movement of drainage water. The exit drain must be directed to one of the above water quality biofiltration systems or back into the irrigation pond for dilution and reapplication to the course.

## Section 5: Best Management Practices

### Strategies for Minimizing Pathogens and Weeds

- The use of cultural practices such as nutrient balancing, environmental modification (e.g., shade reduction), pH adjustments, misting of heat stressed turf, traffic control, etc. prior to pesticide intervention;
- The use of mechanical intervention such as spiking, dethatching, aerification, sharp cutting units (mowers), hand removal of weeds, etc. prior to pesticide intervention;
- The use of biointervention and bioactive products such as parasitic nematodes and *Bacillus Thuringiensis* to control insects. Biostimulants can be used to prevent disease infection and promote a population of beneficial biorganisms;
- The use of biocide product information to select the appropriate control product, rate and application procedure. This would include information on product toxicity, persistence, leach potential, runoff potential, efficacy, etc. This information will help course managers make decisions on control products and environmental protections. Managers should be aware of the consequences of applying a product in its specific environment, as well as its ability to control the target pest without causing harm or toxic accumulation.

### I. Biological Control Program Outline

Biological control of pathogens may be achieved through three different mechanisms:

1. Fungi preying on other fungi, or “mycoparasitism” (examples are species of the *Trichoderma* and *Sporidesmium* families);
2. Antagonistic micro-organisms that produce “antibiotics” can inhibit pathogens. These families include the *Pseudomonas*, *Bacillus*, *Enterobacter*, and others;
3. Niche exclusion can suppress pathogens through competition. Resources are valuable at the soil level and through biostimulation or inoculation it is possible to saturate the niche with neutral or beneficial microbes. Some of the *Pseudomonas* and *Enterobacter* species are fierce and effective competitors.

The best source for beneficial microbes (those antagonistic to pathogens) is from organic fertilizers and composts. Research has demonstrated a high potential for disease suppression from these compounds. Nonetheless, several factors limit the effectiveness of these antagonists:

- Microbes are subject to the same unpredictable environmental conditions as pathogens;
- Antagonistic properties of microbes can be more preventative of pathogens than curative. While microbes can be effective at suppressing disease, they are rarely effective at curing fungal outbreaks;
- Antagonists have a limited effective life span (generally around 30 days), therefore preventative applications must become a regular part of course maintenance;
- Beneficial microbes may be easily cultured from composts but it is difficult to find consistently high quality, biologically active material unless you make it yourself. Bagged organic fertilizers offer a consistent but expensive source of antagonists.

## **2. Chemical Control Program Outline**

Occasionally, chemical imbalances will require a traditional practice to manage turf pests. When the systematic use of alternative management fails, and no other measure will reduce the potential threat of turf grass loss, it may be necessary to prevent further damage to healthy turf through the use of pesticides. Pesticides are the direct result of failures from other control measures including organic and organically synthesized materials.

## Section 6: Pest Management

### Holistic Pest Management

Several strategies are available to control turf grass pests. The holistic approach utilizes each control strategy and combines them into a balanced workable Natural Resource Management Plan. Sound Integrated Pest Management (IPM) strategies include:

- Maintaining balanced nutritional levels;
- Improving micro climates through subsurface drainage, aerification, and increasing air movement/sun penetration;
- Reducing cultural management stresses by limiting scalping of turf, maintaining sharp mower blades, and adjusting mowing heights when necessary;
- Providing adequate replacement of water regulating the build-up of total dissolvable salts in soils.

When searching for alternative strategies, remember simple ideas often achieve the best results. The following are presented as examples:

- Simple hand removal of weeds and/or a spot application with a wick type applicator can provide excellent weed control;
- Reexamination of fungicide management coupled with a willingness to develop IPM strategies to reduce disease pressure. This will serve to reduce fungicide resistance in turf grass;
- Experimental management of insect populations with biologically synthesized insect and mite controls.

### Integrated Pest Management (IPM) Plan, Introduction

Turf grass pests are defined as any disease, insect, nematode, weed, mite, or invertebrate that damages plants. IPM is not a way to control pests, in contrast it is:

- A decision making process;
- Designed to offer protection against pests;
- Designed to yield a product of acceptable quality;
- Intended to minimize disruption to the surrounding ecosystem.

IPM does not preclude synthetically derived pesticides, but encourages a diminished reliance upon them.

IPM requires a thorough understanding of the host ecosystem and the biology of the pest.

It relies upon:

- Regular monitoring of host and pest;
- Clearly established tolerance levels of pest damage before action is required;
- Utilization of micro climate modifications, cultural management, mechanical alterations, biological enhancement or supplements, biological predators and non-toxic bio-control products;
- Chemical controls to keep pest populations below the threshold of economic damage.

## **Appropriate Application of IPM Techniques**

The following IPM techniques are interrelated and are necessary to establish site specific baseline data on pest occurrence. These techniques are designed to decrease pathogenic risks and are reminders to of how simple many IPM practices are to follow. Elements of sound IPM procedures include:

- Documented daily inspection of each golf hole for inclusion in weekly monitoring reports;
- Monthly reports to build a calendar identifying potential active pest areas;
- Quantitative and qualitative assessments of turf areas to establish a proper mode of action;
- Adjustment of mowing heights to reduce weeds, fungus, and insect damage;
- Rotation of routine cutting patterns to prevent excessive wear;
- Avoidance of mowing during high temperature stress;
- Use of syringing or misting during high temperature stress;
- Establishing a point when pest populations or environmental conditions indicate a need to take action;
- Seeking alternative and innovative approaches to control pests. If their effectiveness is field proven, seek appropriate approval for use;
- Apply pesticides when the pest is most vulnerable and where it presents the least hazard to people, property, and the environment.

## **Use Recommendations**

The following policy should be used when applying pesticides:

- The pest will be properly identified. A "scouting program" can be used to identify pests before they become economically or aesthetically significant. The use of disease, insect, and weed identification guides can be beneficial.
  
- Teton County Weed & Pest can be used to identify any unknown pathogens.
  
- A Class "A" Golf Course Superintendent should manage the golf course using the principles expressed in the IPM plan.
  
- Prior to construction, a Certified Pest Advisor should establish acceptable limits of pest and weed impact.
  
- The golf course superintendent should identify and document when the predetermined threshold limit of pest activity has been exceeded.
  
- Environmental conditions should be reviewed regularly and altered (i.e. reduce shade) to reduce unfavorable conditioning triggers and/or pest activity.
  
- Cultural controls should be used to address turf related problems in order to reduce impact (i.e. fertilizers, leaching of salts, removal of mycelium, etc.).

- Mechanical practices (aerifying, spiking, verticutting, etc.) should be considered to improve turf under stress.
- A pesticide application should be made only when there is no alternative measure for control.
- A licensed Certified Pesticide Applicator should be used to apply the recommended biocide to the target pest.
- All pesticide applications should be made in accordance with label specifications.
- A Certified Pesticide Advisor should identify target pests and advise as to the most site appropriate biocide to use.
- In order to minimize drift from the target area, applications should not be made in winds in excess of five mph unless a spray shroud is used. Documentation may be verified by the Environmental Pestcaster or similar weather monitoring station.
- No pesticide should be applied within the native grass areas or in areas of influence to the intermittent streams.
- The applicator should adhere to all label specifications for loading, mixing, and applying the compound. All protective clothing, as specified by the label, should be worn by the applicator.
- Liquid application of a pesticide should be made using a low pressure boom type sprayer with the boom height no higher than 18 inches to further minimize drift.
- The use of low volume Holocene nozzles and applicator spray shields should be installed on the spray boom.
- Notification of the application of a pesticide should be made in accordance with Wyoming State Posting Laws.

**The golf course superintendent should be responsible for the administration of the above policies.**

## **Section 7: Pesticide Precautionary Measures**

### **Posting & Reporting Procedures Outline**

Records required by the Pesticide Control Board should be maintained by the golf course superintendent and pesticide applicator. EPA SARA Title III Emergency Planning Program forms should be completed and submitted by the tenth day of each month as required by law. Material Safety Data Sheets (MSDS) should be available for all pesticides stored on the premises.

Requirements regarding Community/Worker Right-to-Know and all Posting and Notification conditions should be followed. Employees applying pesticides at the course must be licensed by the Wyoming Department of Agriculture. Annual usage forms should be submitted to the Department prior to Dec. 1 and a record of pesticide usage for a minimum of ten years should be kept. Any new federal programs regarding label and reentry measures should be implemented when they are adopted by the Wyoming Department of Agriculture.

### **Pesticide Spill and Response Plan**

A written discharge response plan must be part of the training provided to each employee at the course. The plan must conform to all applicable sections as defined by law. The Plan should be filed with the Teton County Health Department and be readily available. The Wyoming Department of Agriculture and Teton County Weed & Pest must be provided with a current copy of all chemicals and pesticides stored on site. In addition, the Material Safety Data Sheets (MSDS) should be provided for each compound in the storage area.

In the case of minimal discharge, employees must have the necessary protective equipment and clothing available. All materials must be disposed of through a licensed hazardous waste disposal firm. Discharge from dry bulk materials stored within the pesticide storage facility should be recovered by the use of a broom and dust pan used solely for the purpose of recovering these materials. Any material that is not contaminated and suitable for use should be repackaged with an original label affixed to the new packaging. It should be used when the need arises for its intended purpose and not disposed of unless contaminated.

As specified, only pesticides to be used on the golf course should be stored in the building. All employees must receive training on the proper procedure to follow in the event of an accident or fire.

In the event of a fire, the following procedures take effect:

1. The person discovering a fire will notify the agency contracted to provide fire protection services to the project.
2. The person will notify the golf course superintendent as officer in charge. (The fire service departments will be provided with the home number of the golf course superintendent).

3. The golf course superintendent will be responsible for notifying appropriate state and local authorities as prescribed by law.
4. In the interest of safety, all people will be evacuated from the area.
5. The fire will be directly supervised by the responsible fire department agencies. Other organizations will be notified if requested by the fire department.
6. Any other agency deemed necessary after consultation with the above agencies or under advice from the local government, police, or fire departments will be notified.
7. Following a fire, the area will be secured as recommended by the fire marshal or fire department.
8. Appropriate containment barriers will be installed to prevent further contamination of the surrounding area.
9. Upon approval from state and federal agencies, and under the advice of approved consultants licensed in the removal of hazardous waste disposal, the clean-up process will begin.

**The above policy will serve as "all appropriate action" unless otherwise specified or clarified by regulation.**

### **Pesticide Storage Facility**

The pesticide storage facility will conform to the appropriate building codes for Teton County. The local fire agency, and the Teton County Planning Department will be supplied a copy of the floor plan and will be provided a copy of the access security code.

There are three options available for safely storing and using pesticides. They are:

1. A separate or stand-alone storage facility with an internal wash down unloading room;
2. A total closed system inside the golf course maintenance building with an external wash and rinsate pad;
3. A portable steel pre-fabricated storage and containment system.

Each facility must provide a measure of security against accidental spills and efficiently dispose of chemical rinsate. Two of the above designs come complete with containment devices for filling spray tanks while the pre-fabricated system requires the addition of an outside fill station.

In addition, a separate or stand-alone structure of adequate size (approximately 250 feet) should be built at the furthest end of the facility away from offices, break rooms, mechanic areas, or employee eating areas. This structure should be placed at least 50 feet from any routinely inhabited building (other than a dead storage building), reducing the potential for inadvertent pesticide exposure.

The entrance should provide ventilation operated by an external explosion proof light/fan switch. The switch should be covered for security and to protect against vandalism. An instruction card outlining proper entrance and lock-out procedures should be placed at the doorway entrance. The exhaust fan must be positioned so that vapors will be released to the outside of the building.

### **Storage Facility Check List**

The following operating procedure is recommended for all golf course pesticide storage facilities:

- The building is secured and locked at all times.
- Additional keys are placed in the administrative office and in the office of the golf course superintendent in case of emergency.
- Materials should be stored on shelves located high enough to permit the cleaning of the floor. No material should be stored above 6 feet from the ground.
- All materials should have legible labels attached. Any materials whose packaging has been damaged must be in containers clearly marked and labeled.
- Plastic containers should be used to store any containers in excess of one gallon for protection against spillage. A plastic trash barrel with lid should be located inside the storage facility for cleanup.
- Protective clothing and equipment should be provided for those who handle pesticides.
- Absorbent materials designed to contain spills within the storage facility should be available at all times.
- Disposal of pesticide containers should comply with the instructions on the label as well as state and federal regulations. Empty containers should not be stored within the building.
- The building is inspected monthly (at minimum) by the golf course superintendent, and a report of each inspection put in the records for pesticide use.
- Obsolete, excess, and mixtures of pesticides should be disposed of by a licensed hazardous waste firm or according to pertinent statutes and regulations.
- The staff at the proposed golf course should be trained in the operating procedures regarding pesticide storage.

