

Crook Point Golf Club

Integrated Pest Management Plan

I. Introduction

The Crook Point Golf Resort recognizes the importance of sound environmental stewardship, and is committed to optimizing its golf course management practice to protect the environment within, and that surrounding the golf course. The cornerstone of environmental stewardship at Crook Point Resort is the philosophy of Integrated Pest Management (IPM). Simply stated, IPM is a management system that utilizes systematic, disciplined, and documented cultural practices as a first line of defense for pest control.

Several examples of cultural methods to control pests include optimizing turf health through turf management practices to enhance natural plant resistance to pest infestation, optimizing habitats for beneficial species, and minimizing turf damage resulting from routine golf course operations. On occasion, when cultural practices are not fully effective at controlling pests and defined pest damage thresholds have been exceeded, the use of pesticides to manage pest damage may be necessary. An essential component of the Integrated Pest Management plan is the coordination of the ongoing use of cultural methods with the selective use of these agents as a means of minimizing the need for pesticide application. Accordingly, the IPM plan provides Crook Point Resort a sound working framework for the selection and implementation of the most environmentally sound solutions to manage golf course pest problems.

The following document defines turfgrass, non-turfgrass, and aquatic management areas; cultural practices, pests of concern, pest monitoring, pest damage threshold levels that when exceeded require action; and the proper action to be taken under these circumstances. In addition, the document serves as an operational golf course management reference that contains detailed and specific descriptions of practices that are consistent with Crook Point Resort Integrated Pest Management. Because it is dedicated to the Crook Point Resort philosophy and practicality of Integrated Pest Management, it remains vigilant to incorporate emerging, useful golf course management practices into the Integrated Pest Management plan. As a result, this document is viewed to be a functional document that will evolve over time, and one that will be revised to incorporate industry developments that will bolster and optimize the effectiveness of the plan.

II. Integrated Pest Management Definition

Although there are numerous definitions of Integrated Pest Management, the Crook Point Resort will use the definition provided in the Oregon Revised Statute 634.650:

“Integrated pest management” means a coordinated decision-making and action process that uses the most appropriate pest control methods and strategy in an environmentally and economically sound manner to meet agency pest management objectives. The elements of integrated pest management include:

- Preventing pest¹ problems
- Monitoring for the presence of pests and pest damage
- Establishing the density of the pest population, which may be set at zero, that can be tolerated or correlated with a damage level sufficient to warrant treatment of the problem based on health, public safety, economic or aesthetic thresholds.
- Treating pest problems to reduce populations below those levels established by damage thresholds using strategies that may include biological, cultural, mechanical and chemical control methods and that shall consider human health, ecological impact, feasibility and cost effectiveness.
- Evaluating the effects and efficacy of pest treatments.

¹Pest means any vertebrate or invertebrate animal, pathogen, parasitic plant, weed or similar or allied organism which can cause disease or damage to crops, trees, shrubs, grasses or other plants, humans, animals or property.

III. IPM Objectives

- Minimize potential hazards to human health and the environment
- Optimize playing conditions of the golf course
- Control operating costs
- Utilize effective monitoring to enable selective control of pest populations
- Minimize pesticide use through targeted application while optimizing pesticide efficacy
- Sustain high turf grass quality
- Maintain health of landscape elements such as trees, plants, and natural areas

IV. IPM Structure

The structure of the Integrated Pest Management plan is based on the selective targeting of plant pathogens, weeds, and insects that threaten the agronomic health of the golf course. In addition, the Integrated Pest Management plan includes provisions to optimize the quality of aquatic areas of the golf course. The strategy of the Integrate Pest Management plan is as follows:

- Define areas requiring management and the relative maintenance intensity associated with each area
- Maintain vigorous turf health through maintenance practices to optimize pest tolerance
- Identify pests likely to be encountered

- Establish threshold levels for each pest which when exceeded, trigger corrective action
- Scout and monitor for the presence of pests
- Maintain vigorous turf health through maintenance practices to optimize pest tolerance
- Implement sequential corrective action when threshold levels have been exceeded
 - Adjust maintenance practices
 - Utilize biological controls when appropriate
 - Apply minimum amounts of selective chemical agents in a highly targeted fashion. Chemical agents will be selected based on minimal toxicity and optimal efficacy.
- Document all scouting and monitoring observations, treatments, and treatment results

V. Area Definition

The proposed Crook Point Resort is a destination resort which will include a 18 hole golf course. The resort is bordered by the Pacific Ocean to the west, the Gold Beach area to the north and the town of Brookings to the south. The golf course will be constructed using native materials (i.e., native soil) and will incorporate natural features of the landscape into the golf course design. The managed areas of the golf course include turfgrass areas, non-turfgrass areas and aquatic areas which are described below.

A. Turfgrass Areas

All grass types used for each location (tees, greens, etc.) is well suited and adapted for the climate of the area. The turfgrass of greens will consist of fine fescues with creeping and colonial bentgrass. The turfgrass of tees and fairways will also consist of a mixture of fine fescues and bentgrasses, and the rough will consist of a mixture of fine, hard, sheep, chewings and tall fescues. The turfgrass and ornamental (native) areas (shrubs and plants) and their respective management requirements are defined in Table 1.

Table 1. Crook Point Resort Area Definition and Maintenance Requirements

| Area | % Total Area ^a | Fertilizer Requirement | Irrigation Requirement | Mowing Frequency | Cultural Frequency |
|---------------------------|---------------------------|------------------------|------------------------|------------------|--------------------|
| Greens | 4 | Low | Medium | High | High |
| Tee Surface | 6 | Low | Medium | Medium | Medium |
| Fairway | 40 | Low | Medium | Medium | Medium |
| Rough | 40 | Low | Low | Low | Low |
| Native^b | 60 | N/A | N/A | N/A | N/A |

^a estimated golf course management area (turfgrass & ornamentals) based on the average from ten, 18 hole golf courses located in Oregon

^b for this table, ornamentals are defined as native vegetation

B. Non-Turfgrass Areas

Non-turfgrass areas consist of bunkers, ornamental plantings, trees, aquatic areas, and natural areas.

1. Bunkers

Fairway and green-side bunkers will be located throughout the golf course. Bunker management will be confined to routine maintenance including edging, raking and smoothing of sand contained within the bunkers.

2. Ornamental Plantings

A small number of ornamentals plants and shrubs will be located near the golf course clubhouse.

3. Native Vegetation

Select areas of native vegetation that are a part of the existing landscape will remain following the completion of the golf course. Native vegetation (trees, shrubs, ferns and grasses) within the influence of golf course operations will be routinely assessed for overall health, influence on playing characteristics, the presence of insects and diseases, influence on surrounding turf, and hazard potential. In general, insect and diseases pests will be tolerated. Native vegetation in these areas may be managed to optimize landscape health, allow passage of light, minimize hazard, and control pests. Native vegetation outside the influence of golf operations will be allowed to retain a natural character with minimal maintenance.

4. Aquatic areas

a. Ponds

Within the limits of the golf course will be two lined ponds one for irrigation storage and the other for playability and emergency irrigation storage.

5. Natural Areas

Natural areas at Crook Point Resort are areas adjacent to golf course greens, tees and fairways/roughs that will comprise of the native plant material. These areas will be left to provide a wildlife corridor through the property as well as to serve as an environment and habitat for the native bird and animal population.

6. Buffer Zones

Buffer zones at Crook Point Resort are areas adjacent to wetlands or natural watershed areas that will receive no application of fertilizer, fungicides, insecticides, or broadleaf herbicides. Currently, a 25-foot buffer zone is maintained at Portland Parks and Recreation municipal golf courses as defined in the Portland Parks and Recreation *Pest Management Policy*. Similarly, a 25-foot buffer zone is maintained at City of Seattle municipal golf courses in accordance with the *Tri-County Integrated Pest and Vegetation Management Guidelines* (King County). Buffer zones for specific areas of the golf course will be maintained as follows.

a. Wetlands

Buffer zones of 100 feet surrounding each wetland area will be established and maintained. No application of fertilizer, fungicides, insecticides, or broadleaf herbicides will occur in buffer zones.

b. Natural Area (Estuarine Buffer Zone)

A 100-foot estuarine buffer zone between the formal, delineated estuarine wetland boundary (see V.B.5 above) and the golf course perimeter will be established and maintained. No applications of fertilizer, fungicides, insecticides, or broadleaf herbicides will occur within the estuary or the estuarine buffer zone.

7. Cart Paths and Service Roads

The entire golf course will have a continuous concrete cart path will extend from tee to green and tee of the next hole.

VI. Turfgrass Management Practices

Turfgrass area management is the most labor intensive element of the Integrated Pest Management program, requiring greater than 95% of resource allocation. The primary objective of the Integrated Pest Management program is to optimize turfgrass vigor utilizing sound cultural practices as a means of preventing and/or minimizing pest infestation. The primary cultural practices of turfgrass management at Crook Point Resort include mowing, fertilization, and irrigation. Secondary cultural practices include aeration, thatch management, topdressing, overseeding, and sod replacement.

A. Primary Cultural Practice

1. Mowing

Mowing will be performed on an as-needed basis and mowing frequency is area dependent. During the growing season, mowing of greens will occur approximately four times a week, mowing of tees and fairways will occur two times per week. Mowing of the Scottish links grass mixture rough areas will only occur once a year.

Lightweight mowing equipment will be used as often as practical to minimize turf compaction and mowing heights will be adjusted for individual areas based on seasonal/cultural conditions. Mowing heights will be 0.115 to 0.160 inches for greens, 0.375 to 0.750 inches for tees, and 0.50 to 0.75 inches for fairways.

2. Fertilization

Management of nutrients is essential for development of turf vigor. Management of turf fertility involves the understanding of soil composition, plant nutrient requirements, fertility management history, use of soil/tissue test information, and applications of the appropriate fertilizer formulations at the proper time. Additionally, the availability of beneficial soil microbes and biological amendments will be considered when managing the soil nutrient program. The objective of the fertilizer program is to provide optimal nutrient availability to turf while simultaneously avoiding the application of excess nutrients to avoid nutrient runoff/leaching, disease development and weed infestation. Accordingly, every effort will be made to minimize fertilizer application in an effort to strike a balance between optimizing turf vigor and preventing nutrient runoff and/or leaching.

a. Soil/Tissue Nutrient Testing

Testing for nutrient composition provides valuable information that allows for the development of a strategic fertilizer plan and also provides insight into the effect of preceding cultural practices. Tissue nutrient testing provides information relative to

nutrient uptake and plant-available nutrients. At the discretion of the Superintendent, soil/tissue testing will be performed on select areas of the golf course to generate information that will provide technical support during the development and implementation of the fertilizer program.

b. Turfgrass Nutrient Requirements

The major nutrients required for turfgrass health are nitrogen, phosphorus, potassium (NPK) along with calcium, magnesium and sulfur. Essential minor nutrients include iron, boron, copper, manganese, molybdenum, zinc, chlorine and nickel. The availability of nutrients to turfgrass is influenced markedly by the pH of the soil. Consequently, maintenance of the appropriate pH is an important component of the fertilization program. Whenever possible, slow release fertilizers will be used as the primary source of nutrients, with adjustments being made for special needs and conditions. Greens fertilization programs may also include light applications of soluble foliar-adsorbed nutrients applied on a frequent basis (“spoon feeding”).

(1) Major Nutrients

(a) Nitrogen

The management of nitrogen levels is critical owing to the high turf demand for this nutrient and the potential for excess nitrogen to enter into surface water and/or groundwater. As a result, the amount of nitrogen delivered to turfgrass will be the minimum amount necessary to promote turf vigor. In general, nitrogen rates and formulations will be determined based on turf condition, soil/tissue test results, season, weather, and other information. In certain instances when turf and/or climate conditions dictate, rates of application will be adjusted (either higher or lower) at the discretion of the Superintendent.

Nitrogen formulations consist of water insoluble (slow release) and water soluble (quick release) types. Slow release nitrogen sources include methylene urea, sulfur-coated urea, IBDU, polymer coated fertilizers, and organic fertilizers processed and formulated as slow release products. Examples of quick release nitrogen sources include ammonium sulfate, ammonium nitrate, potassium nitrate, and urea. “Bridge” fertilizers combine the best qualities of synthetic and organic fertilizers providing both quick and slow release of nutrients. Where appropriate, organic formulations will be considered for providing sustainable slow release nutrients, soil organic matter, and potentially higher soil biological activity. To maximize plant uptake and minimize nitrogen leaching or storm water runoff (e.g., nitrate), slow release nitrogen sources and/or light applications of soluble nitrogen (“spoonfeeding”) will be used whenever possible.

(b) Phosphorus

Turf requirements for phosphorus are relatively low and phosphorus is relatively immobile in soil. As a result, application rates tend to be

correspondingly low, which minimizes the possibility of leaching or storm water runoff carrying residual phosphorus off-site.

(c) Potassium

Turf requirements for potassium are intermediate to high in relation to nitrogen and phosphorus levels. Although applied to maximize efficiency of uptake, potassium does not pose the extent of environmental risk that excess nitrogen and phosphorus levels represent. Proper levels of potassium are an important component of plant disease resistance and contribute to the ability of turf to withstand wear and traffic.

(2) Minor Nutrients

In general, turfgrass requirements for the minor nutrients iron, boron, copper, manganese, molybdenum, and zinc are substantially lower than those for nitrogen, phosphorus and potassium. Minor nutrients are essential for optimal turf performance and are typically available in soils in sufficient quantities to support healthy turf. However, when turf conditions or soil/tissue testing results indicate deficiencies, these nutrients will be applied at the discretion of the Superintendent.

(3) Supplements and Amendments

A variety of turf supplements and biostimulants such as proteins, amino acids, plant hormones, carbohydrates, humic and fulvic acids, and soil microorganisms have shown promise for the enhancement of turfgrass performance under high stress environments such as putting greens. As research and development of these products progresses, selected products may be used in fertility management at the discretion of the golf course Superintendent.

(4) pH

Maintenance of the proper soil pH is essential in optimizing the availability of nutrients, and also is important in minimizing overall turfgrass stress. When the soil pH requires adjustment to a more alkaline pH, lime will be added until the targeted pH is obtained. When soil requires adjustment to a more acidic pH, ammonium sulfate or another acidifying product will be added until the targeted pH is obtained.

c. Fertilizer Treatment Areas

The rate and frequency of fertilizer application is area and situation dependent. A typical area-specific fertilizer application frequency, and corresponding total yearly nitrogen applied (lbs/1000 ft²) is shown in Table 2. Fertilizer application is most frequent on greens with less frequent applications being made to tees and fairways, and the least frequent application being made to the rough.

**Table 2. Crook Point Resort:
 Fertilizer Application Areas and Typical Yearly Applications**

| Area | % Total Area ^a | Applications per Year | Total Nitrogen per Year |
|------|---------------------------|-----------------------|-------------------------|
|------|---------------------------|-----------------------|-------------------------|

| | | | |
|--------------------|----|-------------|------------------------|
| Greens | 4 | 6 - 10 | 1 - 2 lbs ^c |
| Tee Surface | 6 | 2 - 6 | 1 - 2 lbs |
| Fairway | 40 | 1 - 3 | 1 - 1.5 lbs |
| Rough | 20 | 1 - 3 | 0 - 1 lbs |
| Ornamental | 75 | as required | < 1 lb |

^a golf course management area

^b light rates applied incrementally to minimize growth and potential leaching

^c expressed as lbs nitrogen per 1,000 ft²

d. **Fertilizer Application**

Fertilizer application equipment will be calibrated prior to use to ensure proper rate of application. Fertilizer will not be applied if heavy rain is forecasted following the potential application event.

e. **Fertilizer Storage**

All fertilizers will be maintained in a dedicated moisture free, well-ventilated, approved storage area.

f. **Fertilizer Documentation**

All fertilizer applications will be documented on a fertilizer application form. Information recorded will include date of application, location of application, total area treated, formulation of fertilizer(s), rate of application expressed as lbs. of N/1,000 ft², total quantity of product applied, and the applicator(s) name.

3. **Irrigation**

The distribution of adequate water onto turf via irrigation without over-watering is essential to turf health. In addition to providing optimal moisture levels for turf, irrigation practices are designed to conserve water whenever possible. During periods of hot weather, dry areas will be syringed (hand-watered) in mid-afternoon as required, and cycle and soak watering schedules will be utilized whenever possible. Finally, wetting agents will be used when necessary to improve water infiltration for localized dry spots and other hydrophobic areas of turf. Wetting agents will be applied in accordance with label rates and recommendations.

a. **Water Source**

Crook Point Resort will use creek water on property diverted and pumped to an irrigation holding pond as its primary irrigation water source.

b. **Irrigation System**

The irrigation system will be a computer integrated automated system. Areas of localized dryness will be treated by hand watering or by the use of sprinklers. Daily water use will be determined by ground moisture sensors and measured evapotranspirational losses as determined by an on site weather station networked with the irrigation computer.

c. **Irrigation Water Quality**

No turfgrass problems are anticipated regarding the quality of water (e.g., salt content) used to irrigate turf. However, routine testing of irrigation water quality will be performed to detect any changes that may occur. In the event that turfgrass symptoms indicate potential problems associated with irrigation water quality, water samples will be acquired from irrigation water sources and submitted for irrigation suitability testing by a qualified analytical laboratory.

d. **Water Conservation**

The irrigation system and program will be designed to prevent over-application of water as a means of optimizing turf vigor and conserving water. The areas requiring the most frequent irrigation will be greens and tees. Because it represents a substantial percentage of the overall turfgrass area, the fairways and rough will be irrigated using the deep and infrequent methodology in order to conserve water. This methodology will be carefully monitored to ensure that low areas are not overwatered. “Out-of-play” areas will receive no irrigation due to the plant species abilities to extract required moisture through their deep roots.

The primary means of determining turfgrass irrigation requirements will be the evapotranspirational losses determined by computer supplemented with daily observations and monitoring by the Superintendent and staff. Data obtained from soil moisture sensors and a weather station located on the golf course will be evaluated by the Superintendent to assist in this decision making process. The evapotranspiration data will be entered directly into the computer controlled irrigation system to establish site-specific irrigation duration and frequencies. The computer controlled irrigation system will be configured to replace water on an as-needed basis to promote the health of all landscape assets, while optimizing water conservation.

B. Secondary Cultural Practice

1. Aerification

Aerification is the practice of removing soil cores from turf and is performed to reduce turf compaction. This practice enhances the movement of air, water and nutrients in the soil and is a useful technique to manage thatch layers. Additionally, solid tine aerification is another means of reducing compaction without removing soil which will be the preferred method due to the grassing plan.

Aerification will occur primarily on greens and tee surfaces on a regular basis, at least twice a year. Aeration will be typically performed during periods of active turf growth in the early spring, early summer and fall. Additional aeration may occur at the discretion of the Superintendent. In the case of greens, topdressing sand will be applied to fill the core spaces resulting from the aeration treatment. Finally, deep tine or verti-drain aerification may be performed one to two times per year to aerify at depths of up to 12 inches to improve drainage whenever needed.

2. Thatch Management

Thatch is a layer of organic debris and the roots, crowns, and stems of grass that exists between the soil and the turf canopy. In the absence of cultural management, this layer

becomes thicker over time, resulting in sub-optimal turf growth. Management of thatch is particularly important on greens and consists primarily of aerification and topdressing practices. Efforts will be made to maintain the thatch layer on greens at a depth of 0.5 inches or less. Thatch management practices will include hollow core aerification, solid core aerification and vertical mowing.

3. Topdressing

The practice of topdressing consists of the application of a layer of sand to greens and is used to assist in thatch layer management and to provide a smooth and firm playing surface. Topdressing applications typically follow the aerification or verticutting of greens, and will also be made in the absence of aerification (“light” topdressing). Following the application of sand, the sand will be lightly brushed into the turf surface.

4. Overseeding

Overseeding is the selective application of turfgrass seed to improve areas of turf depletion and to bolster turf density. Overseeding will be performed in the late fall, early spring, or early summer; or on an as-needed basis as determined by the Superintendent.

5. Sod Replacement

Occasionally, problems with diseased, damaged, or weedy turf cannot be remedied by cultural practices. Under these circumstances, affected areas of turf will be removed, and fresh turf obtained from an on-site nursery will be used to replace the removed section.

VII. Tree Management

Numerous trees located at Crook Point Resort will require routine management. General management practices that will be followed are described below.

A. Tree Selection

The Crook Point Resort is designed to maximize the retention of naturally occurring trees existing on the site during the development of the golf course. It is anticipated that several new trees will be planted. Trees considered for planting will be those selected to be consistent and compatible with native species existing on site, and where possible, will be selected for pest resistance properties.

B. Planting Locations

Tree planting locations will be carefully evaluated prior to planting to anticipate the affect of mature trees on surrounding turf. Architectural features, engineering, aesthetics, and influence on playing characteristics of the golf course are important landscape functional considerations. Water requirements, shading, and influence on air circulation will be the primary determinants of planting locations.

C. Tree Planting

Trees will be planted in planting holes appropriate for the root ball/root mass and planting holes will be backfilled with native material. The planting area will be mulched and receive

irrigation as required through the first three growing seasons. Whenever possible, planting will occur during the fall.

D. Tree Maintenance

Trees will routinely be monitored for overall health, influence on playing characteristics, the presence of insects and diseases, influence on surrounding turf and ornamentals, and hazard potential. In general, insect and diseases pests are tolerated. Established trees do not require supplemental watering except in situations of extreme drought. Trees will be pruned to optimize health, allow passage of light, minimize hazard, and manage pests. A commercial tree service will be consulted regarding trees that have disease and/or pest problems beyond the normal scope of golf course management practices.

E. Tree Removal

Factors that will determine if a tree is a candidate for removal (e.g., disease, age, hazard) will be evaluated by the Crook Point Golf Course Superintendent. Upon the determination that tree removal is necessary, the tree will be removed by Crook Point Golf Maintenance staff, or when necessary, by a commercial tree service.

VIII. Composting and Organic Materials Management

A. Grass Clippings and Aerification Cores

Where it is appropriate, grass clippings and/or aerification cores will be spread on site for use as mulch. Materials will be spread out in a thin layer to prevent damage to underlying plants, and will not be applied within buffer zones.

B. Woody Brush

When practical, brush chippers will be used to process tree limbs and other woody material to generate mulch for application to ornamental plant beds, tree wells, steep slopes and natural areas.

C. Logs, Stumps, and Large Woody Debris

Logs, stumps, and woody debris will be stockpiled in suitable storage locations and periodically processed with a wood grinder to generate wood fiber landscape mulch. This material will be used as mulch for ornamental plant beds, tree wells, and natural areas.

IX. Pest Population Definition

A summary of the potential pests at Crook Point Resort is shown in Table 3.

Table 3. Pest Definition and Distribution at Crook Point Resort

| Category | Pest | Turfgrass | Ornamentals |
|----------|--|-----------|-------------|
| | <i>Colletotrichum graminicola</i> or Anthracnose | 3 | |

| | | | |
|------------------------|---|---|---|
| Fungal Disease | <i>Rhizoctonia solani</i> or Brown Patch | 3 | |
| | Fairy Ring caused by many species | 3 | |
| | <i>Microdochium nivale</i> or Pink Snow Mold | 3 | |
| | <i>Pythium</i> | 3 | |
| | <i>Laetisaria fuciformis</i> or Red Thread | 3 | |
| | <i>Magnaporthe poae</i> or Summer Patch | 3 | |
| | <i>Gaeumannomyces graminis</i> var. <i>avenae</i> or Take-All Patch | 3 | |
| Moss | Silvery Thread Moss | 3 | |
| Broadleaf Weeds | Chickweed | 3 | |
| | Clovers | 3 | 3 |
| | Dandelion | 3 | 3 |
| | English Lawn Daisy | 3 | 3 |
| | Plantain | 3 | |
| | Speedwell/Veronica | 3 | |
| Insects | Cutworms | 3 | |
| | European Crane-fly | 3 | |

X. Pest Threshold Levels

The damage threshold levels for specific pest types are shown in Table 4. Damage threshold level is defined as the number of pests detected within a specified area that may lead to corrective action to reduce the density of the specific pest below the damage threshold level.

Table 4. Damage Threshold Limits for Specific Pest Categories

| Pest | Greens | Tees | Fairways | Rough | Ornamentals |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|-------------------------|
| Fungal Disease | 0.2% ^{a,b,c} | 10% ^{a,b,c} | 30% | N/A | N/A |
| Moss | 10% | N/A | N/A | N/A | N/A |
| Broadleaf Weeds | 1/1000 ft ² | 1-5/1000 ft ² | 5-10/1000 ft ² | 20/1000 ft ² | 20/1000 ft ² |
| Insects | | | | | |
| Cutworms | 10/1000 ft ² | 2/ft ² | N/A | N/A | N/A |
| European Crane-fly | 15-25/ft ² | 25-40/ft ² | 25-40/ft ² | N/A | N/A |

^b % of area affected

^c when conditions dictate, preventative measures will be considered

^d spot treatments are considered when conditions dictate

XI. Pest Monitoring and Pest Control

All golf course maintenance staff will be trained in golf course IPM to monitor for evidence of pest infestation. The intensity and frequency of monitoring will be adjusted based on the

likelihood or presence of pest infestation (i.e., seasonal) or in situational/site specific instances. All monitoring observations of potential pest infestation will be reported directly to the Superintendent on the same day of the observation. The IPM process and strategies will be implemented continuously and appropriate corrective action will be implemented as necessary.

The pest control strategy is sequential and consists of using cultural practices as the first line of defense. Pest control strategy will be developed on a case by case basis with all potential control options given consideration. The decision to implement chemical pest control measures beyond cultural, biological, or mechanical practices will be based on the review of relevant safety, scientific, economic, and environmental information. All products used for pest control will be those approved for use by the Environmental Protection Agency for the specific indication.

A. Fungal Disease

Within the overall spectrum of pest management, fungal disease represents the most serious and consistent threat to turfgrass health at Crook Point Resort, and is of concern primarily on greens and tees. Greens and tees will be inspected regularly for symptoms of fungal disease. The primary means of identifying fungal disease will be diagnosis by the Superintendent. However, in some instances symptoms consistent with fungal disease may have alternative causes (nutrient deficiency, insects, etc.). When uncertainty regarding potential fungal disease is encountered, samples will be sent to a plant pathology laboratory for confirmation of the presence of fungal pathogens. More frequent monitoring of greens and tees will occur when conditions known to favor the development of these pathogens occur.

An essential aspect of preventing the development fungal disease is the optimization of turf vigor through routine cultural practice. In addition, fungal disease control is dependent on the understanding the disease cycle and conditions that promote disease development, the correct recognition of disease symptoms, and the selective use of the appropriate fungicide agents when necessary. Specific cultural practices will be employed to minimize the potential for fungal disease, which are described below. In general, if these measures fail and symptoms of fungal infestation exceeds defined damage thresholds, fungicide applications may be necessary to control the disease. Numerous factors including season, weather, and turf health/vigor contribute to the determination whether fungicide treatment may or may not be necessary. Annual review of improved products and rotational application strategies will be implemented to reduce resistance of fungal pathogens to specific products.

A description of conditions favoring disease development, symptoms of disease, and specific control measures for each type of fungal disease that requires pest management follows:

1. Anthracnose (*Colletotrichum graminicola*)

a. Disease Conditions and Symptoms

Anthracnose appears in the summer when temperatures exceed $>78^{\circ}\text{F}$ and soil moisture conditions are high. Disease development is promoted by compaction, excess thatch, and low nitrogen fertility. Symptoms of Anthracnose include yellow to brown irregular shaped areas on turf with grass leaves having yellow lesions with black centers.

b. Cultural Control

Nitrogen will be applied at the rate of 1/2 lb N/1000 ft²/month or less. Light-weight mowing equipment will be used when practical to minimize compaction of turf and the thatch layer will be monitored and managed in an effort to restrict the thatch layer to 1/4 inch or less. Shade will be minimized to improve air circulation for enhanced drying of turf, and irrigation of tees and greens will be avoided in the late afternoon and evening prior to midnight.

c. Fungicide Control

In the event that conditions favoring Anthracnose growth develop, select turfgrass areas will be considered for preventative treatment with Daconil (Chlorothalonil) or Heritage (Azoxystrobin). If actual Anthracnose infestation is diagnosed, affected areas will be treated with Banner (Propiconazole), Bayleton (Triadimefon), or Scotts FF (Thiophanate-Methyl).

2. Brown Patch (*Rhizoctonia solani*)

a. Disease Conditions and Symptoms

Brown Patch appears in the early summer through late summer under conditions of high temperature and humidity, especially when night temperatures exceed 60°F. The disease is particularly severe on turf with high nitrogen and low phosphorus conditions. Symptoms of Brown Patch include brown circular patches several inches to several feet in diameter, which sometimes are surrounded by a smokey-colored boundary.

b. Cultural Control

Moderate rates of nitrogen will be applied at the rate of 1/2 lb N/1000 ft²/month or less. Moderate to high levels of potassium and phosphorus will be maintained. Shade will be minimized to improve air circulation for enhanced drying of turf and drainage will be optimized. Irrigation of tees and greens will be avoided in the late afternoon and evening prior to midnight, thatch will be maintained at 1/4 inch or less, and whenever possible, mowing heights will be raised.

c. Fungicide Control

In the event that Brown Patch infestation is diagnosed, treatment options are Banner (Propiconazole), Bayleton (Triadimefon), Chipco (Iprodione), Daconil (Chlorothalonil), Fore (Mancozeb), Heritage (Azoxystrobin), PCNB (Pentachloronitrobenzene), Prostar (Flutolanil), Scotts FF (Thiophanate-Methyl), Scotts Fungicide VIII (Thiophanate-Methyl + Iprodione), or Scotts IX (Thiophanate-Methyl + Chloroneb).

3. Fusarium Patch/Pink Snow Mold (*Microdochium nivale*)

a. Disease Conditions and Symptoms

Fusarium Patch appears in the autumn, winter, and spring and is very common in Western Oregon during the winter. Conditions favoring disease development include cool temperatures (35° - 65°F) and lush turf growth in which turf contains high nitrogen and low potassium. Symptoms of Fusarium Patch include light reddish to brown patches ranging from one to eight inches in diameter.

b. Cultural Control

Moderate rates of nitrogen will be applied at the rate of 1/2 lb N/1000 ft²/month or less during late summer and fall. Moderate to high levels of potassium and phosphorus will be maintained. Shade will be minimized to improve air circulation to allow for warmer temperatures and enhanced drying of turf, and drainage will be optimized. Irrigation of tees and greens will be avoided in the late afternoon and evening prior to midnight, and soil moisture will be monitored to avoid drought stress. Greens should be dragged in the early morning on days when mowing does not occur for the purpose of removing dew to promote faster turf drying.

c. Fungicide Control

In the event that Fusarium Patch infestation is diagnosed, treatment options are Banner (Propiconazole), Bayleton (Triadimefon), Chipco (Iprodione), Daconil (Chlorothalonil), Fore (Mancozeb), Heritage (Azoxystrobin), PCNB (Pentachloronitrobenzene), Scotts FF (Thiophanate-Methyl), Scotts Fungicide VIII (Thiophanate-Methyl + Iprodione), Scotts IX (Thiophanate-Methyl + Chloroneb), or Scotts X (Iprodione). Preventative treatments, particularly in the fall season on historically susceptible sites may be advantageous for maximum control with minimum product application.

5. Pythium (*Pythium* spp.)

a. Disease Conditions and Symptoms

Pythium infection of turf is caused by a variety of *Pythium* species and can occur in the form of Pythium blight and/or Pythium root rot. The onset of disease can be sudden and devastating to green surfaces. Conditions favoring Pythium development are high temperature and humidity when night-time temperatures exceed 65°F. Symptoms of Pythium infection include greasy brown patches of turf less than inch in diameter that increase to approximately two inches and turn straw-colored.

b. Cultural Control

Moderate rates of nitrogen will be applied at the rate of 1/2 lb N/1000 ft²/month or less and optimum calcium levels will be maintained. Shade will be minimized to allow for warmer temperatures and improve air circulation for enhanced drying of turf, and drainage will be optimized. Mowing of susceptible turf areas will be avoided when night temperatures are greater than 70°F.

c. Fungicide Control

In the event that Pythium infestation is diagnosed, treatment options are Fore (Mancozeb), Heritage (Azoxystrobin), Subdue (Metalaxyl), or Terraneb (Chloroneb).

6. Red Thread (*Laetisaria fuciformis*)

a. Disease Conditions and Symptoms

Red Thread usually occurs between late spring and early summer. Conditions favoring Red Thread development include cool temperatures (40 to 70°F), high humidity, and nitrogen deficiency. Typically, turf damage is not severe, as Red Thread does not infect plant roots. Symptoms of Red Thread include the appearance of reddish strands protruding above turf leaf blades.

b. Cultural Control

Timely and adequate nitrogen fertilization is the key to controlling this disease, particularly in vulnerable new turf areas. Moderate rates of nitrogen will be applied at the rate of 1/2 lb N/1000 ft²/month and moderate to high levels of potassium and phosphorus will be maintained. Shade will be minimized to allow for warmer temperatures and improve air circulation for enhanced drying of turf, and drainage will be optimized. Irrigation of tees and greens will be avoided in the late afternoon and evening prior to midnight. Because dry conditions favor the development of this disease, the use of wetting agents may be used to alleviate this condition.

c. Fungicide Control

In general, cultural practice is sufficient to control this disease. However, in the event that Red Thread infestation is diagnosed and is beyond control through cultural practice, treatment options are Banner (Propiconazole), Bayleton (Triadimefon), Daconil (Chlorothalonil), Fore (Mancozeb), Heritage (Azoxystrobin), or Prostar (Flutolanil).

7. Summer Patch (*Magnaporthe poae*)

a. Disease Conditions and Symptoms

As its name indicates, Summer Patch usually occurs during the summer, when day-time temperatures are greater than 85°F. Conditions favoring Summer Patch development include high soil moisture, poor drainage, and low mowing heights. Symptoms of Summer Patch include circular patches of wilted to straw-colored turf, usually less than 10 inches in diameter. Turf leaf blades turn yellow or brown starting at the tips, and roots are light to dark brown.

b. Cultural Control

Moderate rates of nitrogen will be applied at the rate of 1/2 lb N/1000 ft²/month and “fast release” sources of nitrogen will be avoided. Soil drainage will be improved, soil compaction will be reduced, and turf surfaces will be syringed when temperatures exceed 85°F. Lightweight mowing equipment will be used and whenever possible, mowing heights will be raised.

c. Fungicide Control

In the event that Summer Patch infestation is diagnosed, treatment options are Banner (Propiconazole), Bayleton (Triadimefon), or Heritage (Azoxystrobin).

8. Take-All Patch (*Gaeumannomyces graminis. Var. avenae*)

a. Disease Conditions and Symptoms

Take-All Patch occurs in the spring and early summer when temperatures are between 59 and 76°F. Conditions favoring Take-All Patch development include moist soil, a pH of greater than 5.5, low/unbalanced fertility, and greens with high sand content. Symptoms of Take-All Patch include wilted to bronze colored circular patches that can be as large as several feet in diameter. Turf leaf blades turn yellow, then bronze at the tip, progressing downward. Roots are brown and necrotic. Turf damage can be rapid and severe under warm, dry conditions.

- b. Cultural Control
Fertilizer with acid-forming source of nitrogen such as ammonium sulfate is a fertilization strategy for disease control. Moderate levels of phosphorus and potassium will be maintained. Soil drainage will be improved, and heavy, frequent irrigation will be avoided.
- c. Fungicide Control
If conditions dictate, susceptible areas will be considered for preventative treatment with Heritage (Azoxystrobin) at the discretion of the Superintendent. In the event that Take-All Patch infestation is diagnosed, treatment options are Banner (Propiconazole), Bayleton (Triadimefon), Heritage (Azoxystrobin), or Prostar (Fluotlanil).

9. Yellow Patch (*Rhizoctonia cerealis*)

- a. Disease Conditions and Symptoms
Yellow Patch usually occurs during early to midwinter when temperatures are less than 60°F. Conditions favoring Yellow Patch development include high moisture, excessive thatch, and high nitrogen fertility. Symptoms of Yellow Patch include patches or rings of yellow to straw-colored turf between 8 and 20 inches in diameter. Turf damage is usually not severe, but the loss of turf quality can be significant. Young turf is particularly susceptible Yellow Patch.
- b. Cultural Control
Moderate rates of nitrogen will be applied at the rate of 1/2 lb N/1000 ft²/month or less and moderate to high levels of potassium will be maintained. Shade will be minimized to allow for warmer temperatures and improve air circulation for enhanced drying of turf, and thatch will be maintained at 1/4 inch or less.
- c. Fungicide Control
In the event that Yellow Patch infestation is diagnosed, treatment options are Banner (Propiconazole), Heritage (Azoxystrobin), or Prostar (Flutolanil).

B. Moss

Greens maintenance practices can create an environment that can be favorable for the infestation of various moss species, including Silvery Thread moss (*Bryum argenteum*), which is the species most commonly detected. Moss species in greens may require different control methods than species commonly found in other turf areas.

- 1. Growth Conditions and Symptoms
Conditions favoring moss growth include low mowing heights, frequent irrigation, and low nitrogen fertility.
- 2. Cultural Control
Control measures include raising mowing heights when possible, improvement of turf fertility, and adjusting irrigation to optimize drainage and prevent over-watering. High levels of ferrous sulfate can be used to decrease or eliminate moss populations.

3. Chemical Control

Products showing varying levels of moss control include ferrous sulfate, copper hydroxide (Quicksilver, Junction, Terracyte), and salts of fatty acids.

C. Weeds

The broadleaf weeds that are potential pests and that require monitoring and control by golf course personnel are listed in table 2. All areas will be monitored weekly for the presence of weeds problematic for the respective areas.

A description of the individual areas and measures used to control weeds located in these areas follows:

1. Turfgrass

a. Cultural Control

Broadleaf weed infestation is primarily of concern in turfgrass areas, and is controlled by optimizing turf health through standard cultural practices. Selection of well-adapted turfgrass cultivars in combination with proper cultural practice, fertilization, irrigation, insect and disease control produces a dense vigorous turf that optimizes resistance to colonization by broadleaf weeds. If maintenance practices are not completely effective, the first approach to broadleaf weed control at Crook Point Resort will be mechanical removal (i.e., hand pulling).

b. Chemical Control

Occasionally, in spite of IPM and good cultural practices, one or more of the broadleaf weeds listed in Table 2 may exceed damage threshold levels. On these occasions, affected areas will be treated with an herbicide(s) specifically labeled for the weed requiring control. A listing of herbicides that have potential for use to treat specific indications is provided in Table 6. Whenever possible, applications will be made in the late summer or early fall, when they are most effective.

2. Ornamentals

a. Cultural Control

Broadleaf weeds, grassy weeds, noxious weeds, and woody brush in ornamental areas (shrubs and plants) will be controlled primarily by mechanical means (hand pulling), and whenever possible, weeds should be removed prior to seed production. In addition, mulches such as bark dust or wood chips will be used to control weed populations. A properly planted bed with high densities of desirable plants is a key cultural strategy to effectively crowd out many weed species. Creeping infestation of weeds will be prevented by the installation of hard borders and/or frequent edging.

b. Chemical Control

On occasion, herbicides will be used on a spot treatment basis to control weeds in ornamental shrub and plant areas. Treatment options include Roundup (glyphosate) for non-selective post-emergent control and Surflan (Oryzalin) for pre-emergent control. If significant amounts of weed seed are present, a combination of the two products may be applied to provide for more effective long-term weed control.

Adequate moisture is necessary to activate Surflan, and as a result applications will preferentially be made during the spring and fall seasons.

3. Trees

Weed and grass control around the trunks of trees in turf areas is essential to protect trees from damage resulting from mowing, trimming equipment, and rodents. Weeds around the bases of trees will be controlled primarily by a combination of by mechanical means (hand pulling and string trimmers). Extreme caution will be used when using string trimmers to prevent damage to the bark of trees.

D. Insects

Turfgrass areas are most vulnerable to damage from insect infestation, and the two insects most likely to cause turfgrass damage include Cutworms and the European Crane fly. Monitoring for insects will consist of routine visual inspection of susceptible areas on a weekly basis. General turfgrass cultural practices leading to optimal turf vigor are the primary means of minimizing the potential for insect infestation. If cultural practices are ineffective at preventing damage thresholds for a specific pest from being exceeded, the selective use of biological agents and/or insecticides will be employed. Rotational strategies will be employed as necessary to reduce insect resistance to specific products.

A description of specific insect pests, symptoms of infestation, and corresponding control measures follows:

1. Cutworms (*Noctuidae* family)

a. Insect Description and Infestation Symptoms

The adult cutworm is a moth that lays eggs on grass leaves at night. The resultant larvae are thick-bodied caterpillars approximately 1.5 to 2 inches in length that may be greenish gray, brown, or black, and often have spots or stripes. The larvae reside in the thatch layer during the day and emerge to the surface to feed on the grass blades at night. Cutworm infestation results in small brown circular patches on the turf, and generally occurs during late summer and fall. Also, an indication of cutworm infestation is the presence of birds attempting to feed on cutworms by digging at the thatch layer during the day.

b. Cultural Control

Optimize turf vigor through standard cultural practices.

c. Biological Control

Several insect growth regulators and biological agents including azadirachtin (Turplex, Margosan-O) and *Bacillus thuringiensis* (Bactimos, Dipel, M-One, M-Peril, MVP, Teknar, Thuricide, etc.) have been shown to be effective agents against cutworms. These agents will be considered for use following a cost/efficacy analysis.

d. Insecticide Control

If cultural and/or biological control measures are unsuccessful, the insecticide used to control cutworm infestations exceeding threshold levels will be Dursban (Chlorpyrifos).

2. European Crane fly (*Tipula paludosa*)

a. Insect Description and Infestation Symptoms

The European Crane fly is a flying insect that resembles a large mosquito. Adults lay eggs on the turf in late summer, which hatch in late fall. The resulting larvae are approximately one inch long and are brownish gray in appearance. The larvae feed on the turf during the fall, overwinter, and then become active in the early spring. The larvae reside under the surface of the turf and feed on the turf root system, becoming especially active after soil temperatures exceed 50°F in the early spring. Evidence of infestation is the presence of irregular brownish patches on the turf surface and general turf thinning.

b. Cultural Control

Optimize turf vigor through standard cultural practices.

c. Biological Control

Steinernema carpocapse (Turfcro Vector) is a commercially available nematode shown to be effective at treating European Crane fly infestation. This agent will be considered for use following a cost/efficacy analysis.

d. Insecticide Control

If cultural and/or biological control measures are unsuccessful, the insecticide used to control European Crane fly infestations that exceed threshold levels will be Dursban (Chlorpyrifos).

XII. Pesticides

A. Pesticide Definition

A pesticide is any substance that is used to control pests including insects (insecticide), weeds (herbicide), fungi (fungicide), nematodes (nematicide), and algae (algicide). The mechanism of action of most pesticides is to eliminate the pest by suppressing, weakening or eradicating the target pest.

B. Pesticide Use Determination

The ideal pesticide is highly potent (requires minimal application), is target-specific (is safe for non-targeted species), and is compatible with the environment. While pesticide manufacturers pursue these properties, the degree of cross-toxicity and environmental compatibility in pesticides approved for use by the Environmental Protection Agency can vary considerably. As a result, if avoidable, pesticides will not be used. In the event that pesticide application is necessary, pesticides will be applied according to label.

The primary strategy for pest management as defined in this Integrated Pest Management plan is to optimize turf vigor through cultural practices to optimize turf resistance to, or tolerance of pests. In the event that cultural practices do not contain pest populations below damage

thresholds, biological/chemical control measures will be employed as necessary. Pesticides applied to control pests will be selected by the Superintendent based on their safety, efficacy, economic impact, toxicology and environmental compatibility. In addition, the Superintendent will monitor developments in pesticide research and development; and he/she will incorporate the use of newly developed, tested and improved pesticides approved by EPA where appropriate.

C. Projected Pesticide Use

The locations of pesticide use and the projected frequencies of the application of these agents are shown in Table 5.

**Table 5. Crook Point Resort:
Pesticide Applications Areas and Typical Application Frequencies**

| Area | % Total Area ^a | Pesticide Applications per Year | Pesticide Category |
|--------------------------|---------------------------|---------------------------------|-------------------------|
| Greens | 4 | 2 - 5 | Fungicide |
| Tee Surface ^b | 6 | 1 - 2 | Fungicide and Herbicide |
| Fairway | 69 | 0 - 1 | Fungicide |
| Rough | 20 | spot treatment as needed | Herbicide |
| Ornamental | 75 | spot treatment as needed | Herbicide |

^a golf course management area

^b occasional spot treatment with fungicides when damage thresholds exceeded

The pesticides that have potential for use at Crook Point Resort include 13 fungicides, seven herbicides, and one insecticide (Table 6). To minimize the development of resistance, pesticides in different families with different mechanisms of action will be rotated as frequently as practical and necessary. In addition, if pest resistance to one or more of these pesticides does develop, or if unanticipated circumstances arise, the Superintendent may use alternative pesticides that are EPA approved for treatment of the specific indication.

Table 6. Pesticide Selection for Potential Application at Crook Point Resort

| Pesticide Trade Name | Pesticide Chemical Name | Pesticide Category |
|-----------------------|------------------------------|--------------------|
| Banner | Propiconazole | Fungicide |
| Bayleton | Triadimefon | Fungicide |
| Chipco 26019 | Iprodione | Fungicide |
| Daconil | Chlorothalonil | Fungicide |
| Dithane, Fore | Mancozeb | Fungicide |
| Heritage | Azoxystrobin | Fungicide |
| PCNB | Pentachloronitrobenzene | Fungicide |
| Prostar | Flutolanil | Fungicide |
| Scotts FF | Thiophanate-Methyl | Fungicide |
| Scotts Fungicide VIII | Thiophanate-Methyl/Iprodione | Fungicide |
| Scotts Fungicide IX | Thiophanate-Methyl/Chloroneb | Fungicide |
| Subdue | Metalaxyl | Fungicide |
| Terraneb | Chloroneb | Fungicide |
| | | |
| Casoron ^b | Dichlobenil | Herbicide |
| Crossbow | 2,4-D + Triclopyr | Herbicide |
| Drive | Quinclorac | Herbicide |

Table 6. Pesticide Selection for Potential Application at Crook Point Resort

| | | |
|---------|----------------------------|-------------|
| Garlon | Triclopyr | Herbicide |
| Roundup | Glyphosate | Herbicide |
| Surflan | Oryzalin | Herbicide |
| Trimec | 2,4-D + Dicamba + Mecoprop | Herbicide |
| | | |
| Dursban | Chlorpyrifos | Insecticide |

D. Pesticide Storage

All pesticides will be maintained in a dedicated, dry, well-ventilated, approved storage area that has restricted access and meets the requirements of the State of Oregon.

E. Pesticide Mixing

The entire pesticide product label will be read and understood prior to the use of any pesticide. Prior to pesticide mixing, the Superintendent will determine that local weather conditions are suitable for pesticide application. All pesticides will be mixed according to manufacturer's labeling instructions by a licensed pesticide applicator. Personnel will wear personal protective equipment during the entire mixing process, as recommended in the Material Safety Data Sheet appropriate for the pesticide being mixed. All pesticides will be prepared in a dedicated pesticide mixing area.

F. Signage

All pesticide applications to the golf course will be identified by the posting of Pesticide Application signage. Signage will remain posted for a minimum of 24 hours following pesticide application.

G. Application

All pesticides will be applied by a licensed pesticide applicator or personnel properly trained in the safe application of these agents by a licensed pesticide applicator. Applicators will wear appropriate personal protective equipment appropriate for the pesticide being applied. All pesticide application equipment will be properly calibrated prior to the addition of the pesticide formulation to the equipment and application to the golf course.

The areas of the golf course requiring pesticide application will be specifically defined by the superintendent. Whenever, possible, applications will be selective and limited to localized, targeted areas to minimize the amount of pesticide being applied. No pesticide spray applications will occur if wind speed is above 5 miles per hour or if wind direction or activity will carry pesticides toward, or deposit them upon open water. Pesticides will not be applied if heavy rain is forecast following the potential application event.

No pesticide applications will be made in defined buffer zones. Pest removal (i.e., non-native plants or weeds) in buffer zones will be by mechanical means (hand removal) only.

H. Clean Up and Disposal

Pesticide containers, mixing tanks, and equipment will be rinsed in accordance with recommended procedures and rinse water will be disposed of in accordance with state and local ordinances.

I. Pesticide Documentation

All pesticide purchases and usage will be documented in a pesticide log book as a means of monitoring inventory control. Pesticide application information recorded will include date of application, location of application, and type of pesticide applied, rate of application, weather conditions, and the identity of the applicator. In addition, current pesticide labels and MSDS sheets will be compiled and maintained in a location accessible to all employees. All pesticide documentation will be in accordance with federal and state regulations.

XIII. Facilities Description

A. Maintenance Building

Maintenance functions will be performed in a dedicated maintenance building. The building will be physically segregated into two main areas. The first area will be dedicated to office space and crew quarters, which will consist of the Superintendent's office, the staff lunchroom, staff locker room, and the staff restroom. The second, larger area will be dedicated to equipment storage, equipment maintenance, fertilizer storage, and pesticide storage.

1. Mechanical Shop

This area is where all equipment maintenance and repair work will be performed. All fluids and solvents required for maintenance and repair will be maintained within this area and used fluids and solvents will be disposed of according to federal, state, and local guidelines.

2. Equipment Storage

This area will contain all equipment used in golf course maintenance operations including mowers, tractors, and fertilizer and pesticide application equipment.

3. Fertilizer Storage

All fertilizer will be stored in a dedicated and approved storage area. The storage area will be isolated and allow for the maintenance of fertilizer in a dry, well-ventilated environment that has restricted access.

4. Pesticide Storage

All pesticides will be stored in a dedicated, well-ventilated, locked storage area that has restricted access.

B. Petroleum Fluid Storage and Disposal

1. Fluid Storage

All oils, solvents, lubricants, and antifreeze will be stored in dedicated areas on secondary containment systems.

2. Used Fluids

Used fluids will be stored in separate containers labeled with the identity of the fluid and in containers that are appropriate for storage of the fluid type.

3. Fluid Disposal

Used fluids will be disposed of according to state and local regulations.

C. Fuel Depot

The fuel depot will consist of a double walled pump system that is housed over a concrete spill retention platform.

D. Equipment Washing

Prior to washing, all excess grass and debris will be removed from equipment using compressed air. All equipment will be washed with water only (i.e., no detergent) in dedicated, self-contained equipment wash area. The ESD Waste 2 Water will be used to treat the water that is used to wash equipment.

E. Pesticide Mixing Area

All pesticide mixing will occur at a dedicated mixing area that will have spill response equipment immediately available.

XIV. References

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