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How This Document Was Developed

The National Ornamental and Turf Pesticide Applicator Test Plan and Training Syllabus is the product of interviews with and reviews by commercial applicators in the ornamental and turf industry from around the country. The goal of this project is to provide the states with a practical, adaptable tool to develop ornamental and turf applicator training materials and tests for initial certification that address important job knowledge and skills and that accommodate state-specific interests.

Recruitment of Participants

Ornamental and Turf is a broad category and plantings, pests, and environmental conditions vary greatly across the nation. To account for the regional differences, applicators were selected from Alabama, Arizona, Idaho, Minnesota, and New York to represent jobholders from the Southeast, Southwest, Northwest, Central, and Northeast United States. In addition, Indiana’s Turf Manager Occupational Analysis and Training Syllabus, developed by Purdue Pesticide Programs and the Indiana Office of the State Chemist, both informed and confirmed much of the work presented here.

The State Lead Agency (SLA) or Pesticide Safety Education Program (PSEP) in each state was approached for names of commercial application businesses that exemplify best practices within the broad range of services provided within the federal Ornamental and Turf pest control category (3). As a result, interviews were conducted with 17 pesticide applicators from 13 businesses; combined, these businesses provided pesticide application services for residential turf; residential, corporate, and public landscape; woody ornamental (including trees and shrubs); sports turf; golf course; and interiorscape sites.

Interview Process

Interviews were conducted by phone or in person. In each interview, an applicator was asked to describe the work they perform in a typical day, how the work might vary based on the treatment site and time of year, and the knowledge and skills they need to perform the work. A conversational approach was used in the interviews, which helped the applicators provide greater detail and address less routine parts of the job, such as what can go wrong during an application (including how to respond) and how to interact with the public.

Keep in mind that because the training and tests are aimed at initial certification, the interviews and resulting test plan and syllabus focus on the job of newly certified applicators. Their job responsibilities and requisite knowledge and skills are often quite different from—and more limited in scope than—those of supervisors or company owners who may have been certified for many years.
Synthesis and Review

The work described by each applicator was broken down into a list of tasks (i.e., work activities) that would be observable and would have definite outcomes. An overall description of the job of ornamental and turf applicator, consisting of 53 separate tasks, was developed by integrating the task lists and comments from all the interviews; related tasks were grouped into six job duties. Based on what applicators said about each task during the interviews, knowledge and skill statements that support successful task performance were written.

The applicators interviewed (or their supervisors) were encouraged to provide oversight by reviewing and commenting on the duties, tasks, and knowledge and skill statements to ensure the occupational analysis adequately covered the job responsibilities of a newly certified applicator. Upon request, nine elected to provide content weights for each job duty, which inform test developers as to what percentage of a certification test’s items (questions) should address each duty; the average of these responses was used to assign a percentage to each duty in the final Test Plan and Training Syllabus.

The final step was to develop performance objectives that represent mastery of the job knowledge and skill statements. Applicators (or their supervisors) were again offered the opportunity to comment. Because one purpose of performance objectives is to form the basis for certification test development, SLA representatives in each of the five states involved in the interview process were also provided the opportunity to comment. Final modifications to the Test Plan and Training Syllabus were made to accommodate the suggestions regarding performance objectives.

The National Ornamental and Turf Pesticide Applicator Test Plan and Training Syllabus offers states an effective means to construct tests and training materials which capture important applicator job knowledge and skills and yet still allow sufficient flexibility to address state-specific concerns. It is anticipated that this shared-content approach will benefit the states, their federal partners, and the ornamental and turf applicators.
## Terminology

**Task:** An observable unit of work that generates a product, service, or decision.

**Job:** A stable, coherent collection of tasks.

**Duty:** A job subdivision composed of related tasks.

**Knowledge:** An article of information that jobholders need to possess in order to perform a task.

**Skill:** An acquired proficiency that jobholders need to develop in order to perform a task.

**Performance objective:** A statement describing what the learner is expected to achieve as a result of instruction and which, ideally, forms the basis for writing test items (i.e., questions). Also referred to as a “learning objective” or “instructional objective.”

**Item:** The basic unit of a test. Commonly referred to as a “question.”

**Item bank:** A pool of test items.

## Format

The *National Ornamental and Turf Pesticide Applicator Test Plan and Training Syllabus* is organized into six pesticide applicator Job Duties. Each job duty is weighted to indicate content emphasis on a certification test. Listed under each ornamental and turf applicator Task (bold) within a job duty are Required Knowledge and Skill Statements (italicized) that support task performance, followed by Performance Objectives (normal text) that represent mastery of the required knowledge and skills. The performance objectives provide direction for selecting and writing test items, developing a training curriculum, and writing educational materials.

## Repetition of Knowledge and Skill Statements

A single knowledge and skill statement may appear under more than one task if it is pertinent to each. This is because a given knowledge or skill may be required to successfully perform different tasks. For example, “Knowledge of how pesticides move off site” is important when an applicator evaluates site environmental conditions upon a first visit (Job Duty A, Task IV), conducts a pre-application site assessment (Job Duty C, Task XV), or adjusts the work assignment as conditions change (Job Duty D, Task X).
The reader will note that the knowledge and skill statement “Skill at reading job-related materials” appears under multiple tasks, even within the same job duty. Sometimes, specific types of job-related materials (e.g., product label, equipment manual) are mentioned for emphasis; however, the actual skill—being able to read—is the same regardless. Every interviewee indicated that without the skill of basic literacy, a person would be unable to perform the job of ornamental and turf pesticide applicator. States should keep this in mind when deciding which test formats would be acceptable.

The reader will quickly observe that for some tasks, there are fewer performance objectives than there are knowledge and skill statements. A more careful read will reveal that in many cases, a task’s performance objectives do not address every knowledge and skill statement pertaining to that task. These discrepancies can occur for one or more of the following reasons:

1) Some knowledge and skill statements do not lend themselves to assessment by paper-and-pencil measures which are typical of certification tests. If all of a task’s knowledge and skill statements fit this description, the list of performance objectives will contain only the phrase “Not testable” (e.g., Job Duty A, Task I).

2) Some knowledge and skill statements reflect Core knowledge that does not assume any additional significance in an ornamental and turf context. If all of a task’s knowledge and skill statements fit this description, the list of performance objectives will contain only the phrase “Core content—omitted from category examination” (e.g., Job Duty E, Task VI).

3) A knowledge and skill statement listed under a task might be addressed by one or more performance objectives that address the same statement under a separate task elsewhere in the test plan and training syllabus. If all of a task’s knowledge and skill statements fit this description, the list of performance objectives will contain only a reference to the separate task (e.g., see Job Duty F, Task II).

4) A single performance objective might cover more than one knowledge and skill statement.

In cases 1) and 2) above, the lack of representation on a test does not negate the fact that the knowledge and skill statements were deemed important to the job of ornamental and turf applicator. Therefore, trainers may—and in some cases should—elect to develop educational materials that cover these areas even though there will be no corresponding test content.
Case 3) results from the fact that in contrast to knowledge and skill statements, any given performance objective is presented only once in the test plan and training syllabus. This is because the entire list of performance objectives in the test plan and training syllabus covers everything a learner is expected to achieve; repeating an objective would neither broaden such expectations nor provide added value to the learner.

**Flexibility for State Programs**

As mentioned in “How This Document Was Developed,” the National Ornamental and Turf Pesticide Applicator Test Plan and Training Syllabus is meant to be adaptable because each state is unique. Some of that adaptability is highlighted here.

**State Situations and Terminology**

Some performance objectives relate to topics or situations that will differ from state to state; examples include state laws (e.g., customer notification requirements) or pest problems. The text of these objectives will include “[your state]” or “[your state’s],” which can be replaced with the name of the user’s state (e.g., “Iowa” or “Iowa’s”). This approach ensures that the test and training are flexible to meet the needs of each state’s certifying agency and training organization.

**NOTE:** In some states, one or more of the state-specific performance objectives described above may be irrelevant and should therefore be excluded from a state’s testing and training. For example, the performance objective “Identify the common weeds in ornamental and turf settings in [your state]” may not be applicable where geographical features result in widely different environmental conditions from one large area of the state to another, such that no weeds are “common” between them.

Some states refer to “certified” applicators whereas others use the term “licensed.” Therefore, where knowledge and skill statements or performance objectives contain phrases such as “[certification / license]” or “[certified / licensed],” a state can choose which of the alternate terms it prefers to use.

**Modification of Performance Objectives**

As will be discussed later in this document, it is important to list the performance objectives in a training manual and to link them to the items in the certification test. However, states may differ in how they choose to write test items. Therefore, states should take advantage of the fact that it can be possible to modify a performance objective in such a way that the modified objective would still cover what the test plan and training syllabus identified as what a learner is expected to achieve; this will allow a state to better align the performance objectives with the training being offered.
For example, Performance Objective 12 under Job Duty A, Task V states “Describe the signs and symptoms of common diseases of ornamentals and turf in [your state].” The following modifications would be consistent with this original objective (state name and abbreviated list of diseases added for purpose of illustration only):

- Describe the signs and symptoms of the 3 most important diseases of ornamentals and turf in New York.
- Describe the signs and symptoms of the following diseases of ornamentals and turf in New York:
  - Snow mold
  - Fire blight
  - Powdery mildew
- Given a picture or description of signs and symptoms, identify the following diseases of ornamentals and turf in New York:
  - Snow mold
  - Fire blight
  - Powdery mildew

As long as the intent of the performance objective remains the same and it continues to assess the appropriate knowledge and skills, modifications such as these are perfectly acceptable.

Finally, it has already been stated that Ornamental and Turf is a very broad category. States will differ with regard to which applications are covered under this category and/or how the category is split into subcategories. This can affect the use of the Test Plan and Training Syllabus in two ways:

1) A state may choose to add to the Test Plan and Training Syllabus to address topics currently excluded from it. For example, each of the 17 applicators interviewed was asked if they used pesticides (or even nonchemical means) to control vertebrate pests in turf and landscape settings. All answered that they did not do so, and therefore this topic is not covered in the current Test Plan and Training Syllabus. If vertebrate pest control is considered important by a given state, that state can and should add that topic to its test and training program.

2) In states in which the Ornamental and Turf category is split into subcategories, performance objectives in the current Test Plan and Training Syllabus should be selected and/or modified as needed. For example, in the case of a subcategory for Interiorscapes, topics such as weed management and equipment calibration would most likely be greatly de-emphasized. Also, the phrase “ornamentals and turf” that appears in many performance objectives could be changed to “interiorscapes.”
Curriculum Development

The trainer who uses this document to revise an existing Ornamental and Turf applicator-training curriculum, or to develop a new one, should focus on the performance objectives under each job duty. The performance objectives offer educational content for training manuals and classroom instruction.

A trainer revising an existing manual might begin by gauging how closely manual content addresses the performance objectives in this document. Additional material may be included in the subsequent revision to ensure close correspondence between the newly revised manual and the performance objectives. Note that there is no compelling reason to organize a manual according to the various job duties and content coverage percentages presented in this document. Manual organization and presentation are left to the discretion of the trainer. However, the trainer is encouraged to precede each chapter or manual section with a list of the performance objectives from this document which the chapter covers, in order to alert the learner to what is expected of them.

In the case of a new manual, the trainer will first have to make a decision about the general outline of the manual. For example, based on prior experience, the trainer might elect to establish chapters that correspond to classroom presentations or stand-alone topics (e.g., pest biology, pest management choices, equipment types, calibration, environmental concerns, and applicable state laws). After a general structure is determined, text is drafted to address the performance objectives in this document, following essentially the same suggestions described in the previous paragraph.

Application of performance objectives to classroom instruction parallels manual development. It is anticipated that these performance objectives will suggest some new ideas for training content for both initial and recertification purposes. As you begin to work with this document to develop your Ornamental and Turf pesticide applicator training materials and certification test, it will become evident that the performance objectives are the thread that ties the job, training manual, and certification test together.

If, at any time, you are uncertain about how to use this document, please feel free to contact info@nasda.org or 202/296-9680 for suggestions and clarification.

Test Development

NOTE: An item bank to accompany this Test Plan and Training Syllabus will be developed in the future. Suggestions offered below regarding test development apply whether a state waits to use the item bank or develops items on its own or in collaboration with other states.
| **Determine Total Number of Items To Include on Test** | The test developer who uses this document to build an applicator certification test is advised to first determine a total number of items to include on the test. Seventy, at a minimum, is recommended, but this is left to the discretion of the individual test developer. Using Job Duty A as an example, if a 70-item test is desired, then 22 percent of the test items (15 or 16 items) should relate to the performance objectives under Job Duty A and they should be written (or selected from the item bank when it becomes available) to maximize coverage of objectives in Job Duty A. |
| **Write State-Specific Items as Needed** | Some performance objectives refer to specific state situations, such as laws and common pests, and will have no corresponding questions in a test item bank. For these state-specific performance objectives, the test developer will—where appropriate—have to draft their own state-specific items. |
| **Balance Response Options on Selected Items** | The process of writing items (or selecting items from the item bank when it becomes available) by matching performance objectives with items, in proportion to job duty content weight, is repeated for each remaining job duty. When all of the test items are assembled, determine how many times each response option (e.g., A, B, and C) for multiple-choice items is correct. Assuming there are three responses per item, correct responses should be balanced such that approximately 33 percent of the test items are scored A, 33 percent are scored B, etc. If this is not the case, then reorder the options on those items where the correct response is proportionately too high to achieve the desired balance. Balancing correct responses minimizes the possibility that individuals who are unfamiliar with the subject matter could achieve higher scores by consistently selecting the same response option. |
| **Establish a Passing Score** | A passing score may now be established for the resulting test (e.g., by application of state requirements or on recommendation of a standard-setting committee). |
| **Determine a Testing Time Limit** | Allow candidates sufficient time to complete the test by allotting approximately one minute per test item. |
Job Duty A: Assess Treatment Site (22%)

Task I. Determine type of application site (e.g., residence, golf course, park, school, interiorscape).

Knowledge and Skills
a. Skill at reading job-related materials (e.g., job ticket)

Performance Objectives
Not testable

Task II. Measure treatment site.

Knowledge and Skills
a. Skill at identifying property boundary lines
b. Knowledge of different measurement techniques and devices (e.g., measuring wheel, tree diameter tape measure)
c. Skill at basic arithmetic
d. Skill at estimating area

Performance Objectives
Not testable or Core content—omitted from category examination

Task III. Determine condition of desirable plants (e.g., turf, ornamentals, shade trees).

Knowledge and Skills
a. Skill at evaluating plant condition
b. Skill at verbal communication (e.g., with customer, site manager)
c. Skill at identifying common plant species
d. Knowledge of common species/types of desirable plants in [your state].
e. Knowledge of the appearance of healthy plants.

Performance Objectives
1. Distinguish between healthy and unhealthy desirable plants (e.g., turf, trees, shrubs).
2. Explain how a site's intended use can impact the required level of pest control.
3. For common woody ornamentals (shrubs and trees) in [your state], describe the:
   a) Leaf arrangement, structure, and shape
   b) Twig arrangement
   c) Bud arrangement
   d) Flower structure
4. Distinguish between the common turfgrass species in [your state].
5. Match temperature conditions (e.g., seasons, temperature ranges) to dormancy (if any) and maximum performance for common turfgrass species in [your state].
6. Match common turfgrass species in [your state] to their typical uses (e.g., for shady lawns, warmer climates, fairways, sports turf).
Task IV. Evaluate site environmental conditions.

Knowledge and Skills

a. Knowledge of sensitive site information (e.g., setbacks, pesticide label restrictions)

b. Knowledge of how pesticides move off site (e.g., runoff, drift, volatilization)

c. Knowledge of pesticide hazards to nontarget sites and species

d. Skill at recognizing drainage patterns

e. Skill at recognizing changing environmental conditions (e.g., wind, rain, temp, humidity)

f. Skill at identifying nearby sensitive sites (e.g., herbicide-sensitive plants, listings on [your state's] chemically sensitive people registries, surface waters, active pollinators)

g. Skill at verbal communication

Performance Objectives

1. Describe situations for which a pesticide label might require setbacks (buffers) or other restrictions (e.g., when pollinators are active).

2. Discuss how soil texture can influence the selection of pest control options.

3. Explain how a cut-stump treatment can be a risk to nearby trees.

Task V. Evaluate site for pest and environmental stresses (including stresses caused by poor cultural practices).

Knowledge and Skills

a. Skill at evaluating environmental stresses

b. Knowledge of relationship between pest problems and (improper) cultural practices

c. Skill at reading job-related materials

d. Knowledge of pest-scouting and sampling techniques

e. Knowledge of integrated pest management (IPM)

f. Skill at identifying common pests (e.g., weeds, insects, diseases, vertebrates) in [your state]

g. Skill at verbal communication

Performance Objectives

1. Describe common problems in ornamentals and turf caused by abiotic (non-living) factors in [your state].

2. Describe the relationship between cultural practices and pest pressure/environmental stress.

3. Describe the conditions (including weather and improper cultural practices) that encourage weed infestations, including how those conditions arise and, if possible, how to avoid them.

4. With respect to trees, give examples of how cultural practices and physical damage can influence disease development as well as disease management decisions.

5. List sources (e.g., books, experts) for obtaining help in identifying weeds, pest insects, and plant diseases.
6. Describe the benefits of a regular pest-scouting program and its role within an IPM program.

7. Describe the following insect pest scouting techniques:
   a) Visual inspection
   b) Cup test (flotation) in turf
   c) Pull turf back
   d) Sticky traps

8. Describe procedures for determining the cause and extent of turf, shrub, and tree problems, including how to take and submit samples for pest analysis.

9. Identify the common weeds in ornamental and turf settings in [your state].
   *(Note to test/curriculum developers: Newly certified applicators are expected to easily identify no more than 3-5 common weeds.)*

10. For each of the common insect pests of ornamentals and turf in [your state]:
    a) Identify the pest.
    b) Indicate the damaging life stage.
    c) Identify the direct and indirect damage caused by the pest.
    *(Note to test/curriculum developers: Newly certified applicators are expected to easily identify no more than 3-5 common turf insect pests and 3-5 common ornamental plant insect pests.)*

11. Discuss factors to consider when determining whether a health problem in a plant is due to a plant pathogen or an abiotic factor.

12. Describe the signs and symptoms of common diseases of ornamentals and turf in [your state].
    *(Note to test/curriculum developers: Newly certified applicators are expected to easily identify no more than 3-5 common turf diseases and 3-5 common ornamental plant diseases.)*

**Task VI. Identify application obstacles (e.g., gardens, pets, toys, property lines).**

Knowledge and Skills

a. *Skill at identifying application obstacles (e.g., presence of people; pets; toys; leaves, limbs, and other debris)*

b. *Skill at verbal communication*

Performance Objectives

1. List steps you can take to prepare a site for an effective and safe pesticide application (e.g., to protect people and nontarget organisms).
Job Duty B: Engage in Plant/Pest Management Program (24%)

Task I. Advise/assist with appropriate cultural practices (e.g., seeding, watering, mowing).

Knowledge and Skills
a. Skill at verbal communication
b. Skill at written communication
c. Knowledge of proper cultural practices (e.g., watering, mowing, fertilization, mulching, establishment, traffic management) for the desirable plants involved.
d. Knowledge of integrated pest management (IPM)

Performance Objectives
1. Describe how proper cultural practices vary for the different species of turfgrass commonly grown in [your state].
2. Describe how the following cultural practices improve plant condition (e.g., with respect to pest problems):
   a) Watering
   b) Mowing
   c) Fertilization
   d) Siting (e.g., matching a desirable plant to a site suitable for its growth)

Task II. Implement weed management program.

Knowledge and Skills
a. Knowledge of weed types (e.g., grass vs broadleaf, tree vs shrub)
b. Knowledge of weed life cycles
c. Skill at identifying common weed problems in [your state]
d. Knowledge of cultural practices that affect weed problems
e. Knowledge of integrated pest management (IPM)
f. Knowledge of nonchemical weed control practices
g. Knowledge of herbicide types (basic mode of action; e.g., contact vs translocated, selective vs nonselective)
h. Knowledge of chemical weed control practices (e.g., purpose, application timing, soil application, cut-stump treatment, foliar spray, broadcast application)
i. Knowledge of herbicide resistance
j. Skill at reading job-related materials (e.g., referring to treatment records, using herbicide resistance management statements on product labels)

Performance Objectives
1. Distinguish between weed types (e.g., grass vs broadleaf, softwood vs heartwood).
2. Distinguish between trees that do and do not resprout after felling.
3. Describe the life cycles of annual, biennial, and perennial weeds.
4. Give examples of nonchemical weed control methods, including situations in which they are effective and practical.
5. Contrast the following herbicide types:
   a) Contact vs translocated (systemic)
   b) Preemergence vs postemergence
   c) Selective vs nonselective
   d) Foliar-applied vs soil-applied

6. Given the stage and life cycle of a weed (e.g., seedling biennial, established perennial), determine which herbicide type(s) would provide control.

7. Give examples of how plant growth regulators can be beneficial in ornamental and turf settings.

8. Describe how broadleaf herbicide modes of action work.

9. Explain how herbicide resistance develops in weed populations.

10. Describe weed management practices that reduce the potential for herbicide resistance to develop in a weed population.

Task III. Implement insect management program.

Knowledge and Skills

a. Knowledge of insect life cycles
b. Skill at identifying common insect problems in [your state]
c. Knowledge of damaging insect life stages
d. Skill at scouting for insects
e. Knowledge of cultural practices that affect insect problems
f. Knowledge of integrated pest management (IPM)
g. Knowledge of nonchemical insect control practices
h. Knowledge of insecticide types (basic mode of action)
i. Knowledge of chemical insect control practices (e.g., application timing, curative vs preventive treatments, trunk injection, spot application)
j. Knowledge of insecticide resistance
k. Skill at reading job-related materials (e.g., referring to treatment records, using insecticide resistance management statements on product labels)

Performance Objectives

1. Given a common insect pest, describe its life cycle, including when (with respect to season and/or weather conditions) it causes plant damage. 
   (Note to test/curriculum developers: Newly certified applicators are expected to easily identify no more than 3-5 common insect pests.)

2. Match a given insect pest to its feeding habits, including host plants and where on the plants it can be found.

3. Describe turf damage caused by vertebrates that indicates the presence of insect pests.

4. Explain how plant selection, including plant source selection, influences the likelihood of pest problems in interiorscapes.

5. List steps you can take to prevent insect problems before installing an interiorscape.
6. Describe conditions under which insects can become a problem after you install an interiorscape.

7. Give examples of nonchemical insect control methods, including situations in which they are effective and practical.

8. Distinguish between the following insecticide types:
   a) Contact poison
   b) Stomach poison
   b) Systemic insecticide

9. Explain how each of the following insecticide types control pests on or in woody ornamentals or interiorscapes:
   a) Horticultural oils
   b) Baits
   c) Diatomaceous earth

10. Given a common insect pest, describe the relationship between damaging stage and application timing.
    (Note to test/curriculum developers: Newly certified applicators are expected to easily identify no more than 3-5 common insect pests.)

11. Explain conditions under which the following insecticide application techniques are appropriate:
    a) Foliar treatment
    b) Trunk injection
    c) Soil injection
    c) Soil drench

12. Explain how insecticide resistance develops in pest insect populations.

13. Describe insect pest management practices that reduce the potential for resistance to develop in a pest insect population.

Task IV. Implement disease management program.

Knowledge and Skills
a. Skill at identifying common plant disease problems in [your state]
b. Knowledge of the disease triangle
c. Skill at scouting for disease problems
d. Knowledge of cultural practices that affect disease problems
e. Knowledge of integrated pest management (IPM)
f. Knowledge of nonchemical disease control practices
g. Knowledge of fungicide types (basic mode of action)
h. Knowledge of chemical disease control practices
i. Knowledge of fungicide resistance
j. Skill at reading job-related materials (e.g., referring to treatment records, using fungicide resistance management statements on product labels)
Task V. Select pesticide products and application rates.

Knowledge and Skills

a. **Skill at reading job-related materials** (e.g., the pesticide label)

b. **Knowledge of variables that influence pesticide product selection** (e.g., site, pests, toxicity, environmental risks, weather conditions, nontarget organisms such as bees, site-specific rules in [your state], cost)

c. **Knowledge of integrated pest management (IPM)**

d. **Knowledge of relationship between pest spectrum/pressure and application rates**

e. **Knowledge of company policy**

Performance Objectives

1. Determine whether a pesticide can be used for the intended purpose (e.g., application site, pest problem, desirable plant species).
2. Discuss factors to consider when selecting a pesticide to use, including how it fits within your IPM program.
3. List factors to consider when selecting adjuvants to add to a spray tank.
4. Describe how fertilizer restrictions in [your state] can influence your choice of pesticide and timing of application.
5. List factors to consider when selecting the application rate for a pesticide.
Job Duty C: Prepare (Equipment, Site, and People) for Application (17%)

Task I. Secure application credentials.
Knowledge and Skills
a. Skill at reading job-related materials
b. Knowledge of [your state's] [certification / licensing] rules (category-specific, including rules for specific sites such as schools, golf courses, etc.)
c. Knowledge of [your state's] [certification / license] types
d. Knowledge of [your state's] rules regarding direct supervision
e. Knowledge of customer's safety training requirements for contractors
Performance Objectives
1. Distinguish between applications you can and cannot make as a [certified / licensed] Ornamental and Turf pesticide applicator.
2. Describe each of the applicator [certification / license] types in [your state] (e.g., for hire, public, qualified party, technician).
3. Explain why an interiorscape customer might require you (or applicators you supervise) to take the customer's company employee safety training.

Task II. Prepare customer information materials (e.g., invoice, posting signs).
Knowledge and Skills
a. Skill at reading job-related materials
b. Skill at basic arithmetic
c. Skill at written communication
d. Knowledge of [your state's] posting and customer notification requirements (including neighbor notification and for applications to schools, golf courses, etc.)
e. Knowledge of company policy
Performance Objectives
1. With respect to [your state's] regulations regarding posting warning signs at the site of application, tell:
a) Whether posting is required at a given site.
b) What warnings and information must be on the signs.
c) When signs are to be posted (e.g., before application, immediately after application).
d) When signs can be taken down.
e) Where signs are to be posted.
f) Who is responsible for posting and removing the signs.
Task III. Prepare recordkeeping materials.

Knowledge and Skills

a. Skill at written communication
b. Knowledge of [your state's] recordkeeping requirements (including any special requirements for applications of particular pesticides or to schools, golf courses, etc.)

Performance Objectives

1. Indicate whether [your state] requires you to keep records of pesticide applications.
2. List the types of information [your state] requires you to record for a given pesticide application.

Task IV. Develop a spill response plan.

Knowledge and Skills

a. Knowledge of spill reporting requirements
b. Knowledge of spill response procedures
c. Knowledge of spill control equipment
d. Knowledge of spilled-product disposal options
e. Knowledge of company policy

Performance Objectives

Core content—omitted from category examination

Task V. Maintain label and Safety Data Sheet (SDS) book.

Knowledge and Skills

a. Skill at reading job-related materials
b. Knowledge of differences between pesticide product labels and SDSs
c. Knowledge of where to obtain pesticide product SDSs
d. Knowledge of OSHA requirements
e. Knowledge of DOT requirements

Performance Objectives

Core content or outside the scope of the category—omitted from category examination

Task VI. Review work assignments (with supervisor or those you supervise).

Knowledge and Skills

a. Skill at written communication
b. Skill at verbal communication
c. Skill at reading job-related materials
d. Knowledge of [your state's] rules regarding direct supervision

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Performance Objectives
1. Regarding [your state's] rules about direct supervision, tell:
   a) When such supervision is required.
   b) Who is qualified to provide direct supervision.
   c) The conditions that must be met (e.g., on-site supervision vs voice contact).
   d) The conditions under which supervision is not allowed (i.e., the person making the application must be [certified / licensed]).
   e) What the supervising applicator's responsibilities are.

Task VII. Obtain pesticide product.

Knowledge and Skills
a. Knowledge of company policy
b. Knowledge of [your state's] rules for purchasing pesticides
c. Knowledge of company pesticide product storage/inventory practices

Performance Objectives
Core content—omitted from category examination

Task VIII. Perform (transportation) vehicle inspection.

Knowledge and Skills
a. Skill at vehicle operation
b. Knowledge of DOT requirements
c. Knowledge of [your state's] identification requirements for pesticide service vehicles
d. Skill at performing routine safety inspections

Performance Objectives
1. Regarding [your state’s] DOT regulations regarding commercial vehicles:
   a) Tell whether your service vehicle is subject to the regulations and, if so,
   b) What you must do to comply with the regulations.

Task IX. Inventory on-board vehicle supplies.

Knowledge and Skills
a. Knowledge of required on-board paperwork (e.g., according to [your state’s] regulations)
b. Knowledge of pesticide products and pesticide application equipment required for daily pest management activities.

Performance Objectives
1. List the on-board paperwork that [your state] requires you to have in a vehicle when you transport pesticides and when you apply them.
2. Tell if and how service vehicles must be marked for identification according to [your state's] pesticide regulations.
Task X. Select personal protective equipment (PPE).

Knowledge and Skills
- a. Skill at reading job-related materials (e.g., pesticide label, PPE product descriptions)
- b. Knowledge of types of PPE
- c. Knowledge of PPE sources/suppliers
- d. Knowledge of proper PPE use

Performance Objectives
1. Given a pesticide product label, determine which PPE is suitable for a particular handling activity (e.g., mixing vs applying).

Task XI. Select/inspect application equipment.

Knowledge and Skills
- a. Skill at equipment operation
- b. Knowledge of equipment types, uses, and function
- c. Knowledge of nozzle spray patterns
- d. Knowledge of techniques to minimize spray drift
- e. Knowledge of common equipment problems

Performance Objectives
1. Describe the function and uses (e.g., spot spray vs broadcast) of the following application equipment:
   - a) Boom sprayer
   - b) Hose reel sprayer
   - c) Hand-held/backpack sprayer (including a rolling pump sprayer)
   - d) Rotary spreader (push, hand-held, or vehicle-mounted)
   - e) Broadcast (or drop) spreader

2. Give examples of how equipment choices (e.g., sprayer, gun, nozzles) can help you minimize pesticide drift.

3. List common causes of sprayer leaks.

4. Describe common equipment problems and how to detect them.

Task XII. Determine total treatment area of all scheduled applications.

Knowledge and Skills
- a. Skill at basic arithmetic
- b. Skill at reading job-related materials

Performance Objectives
Core content—omitted from category examination
Task XIII. Load pesticide products (and other supplies) onto transportation vehicle.

Knowledge and Skills
a. Knowledge of [your state's] service container rules (e.g., labeling sprayers)
b. Knowledge of pesticide product transportation security practices
c. Knowledge of DOT requirements

Performance Objectives
1. Describe the requirements of [your state's] rules for service containers (e.g., labeling).

Task XIV. Ensure delivery of advance notification (as required).

Knowledge and Skills
a. Skill at written communication
b. Skill at oral communication
c. Knowledge of [your state's] notification rules (e.g., of customer, customer's neighbors, persons on notification registry, school)

Performance Objectives
1. For a given site of pesticide application, tell:
   a) Whether advance notification must be given.
   b) What the notification must contain.
   c) To whom advance notification must be given.
   d) The means by which advance notification must be given.
   e) When the notice must be given.
   f) Who must provide advance notification.

Task XV. Conduct (pre-application) site assessment.

Knowledge and Skills
a. Skill at evaluating plant condition
b. Knowledge of real-time site conditions
c. Knowledge of how weather and environmental conditions affect pesticide application and efficacy
d. Knowledge of application risks to others (e.g., time of day)
e. Knowledge of [your state’s] drift rules
f. Knowledge of how pesticides move off site (e.g., runoff, drift, volatilization)
g. Skill at evaluating risks to nontarget organisms (e.g., bees)
h. Knowledge of [your state's] customer notification rules (e.g., if new pest problem is detected)
i. Skill at verbal communication
Performance Objectives

1. Tell why (and how) you should remove dew before applying pesticide to a golf green.
2. Give examples of conditions at an intended site of application which would lead you to delay or stop an application.
3. List steps you can take to warn golfers and others that pesticides will be applied to a golf course.
4. Give examples of situations which pose a high risk of injury to nontarget organisms (e.g., 2,4-D applications near grapes, risks to bees and other pollinators).
Job Duty D: Ensure Application Accuracy (20%)

Task I. Calibrate application equipment.
Knowledge and Skills
a. Skill at equipment operation
b. Skill at reading job-related materials (e.g., pesticide label)
c. Knowledge of equipment types and proper function
d. Knowledge of when to calibrate equipment
e. Knowledge of calibration methods (liquid and granular)
f. Knowledge of relationship between speed and application rate
g. Knowledge of relationship between spray pressure and application rate
h. Skill at basic arithmetic
i. Knowledge of materials needed for calibration activities

Performance Objectives
1. Explain when you should calibrate a piece of application equipment.
2. Describe procedures for obtaining the desired spray rate (liquid) or application rate (granular) and uniform coverage for:
   a) Boom sprayers.
   b) Hose reel sprayers.
   c) Granular spreaders.
   d) Soil injectors.
   f) Trunk injectors.
3. Describe common means of adjusting the spray rate (liquid) or application rate (granular) for:
   a) Boom sprayers.
   b) Hose reel sprayers.
   c) Granular spreaders.
4. Describe the relationship between application speed and application rate.
5. Describe the relationship between spray pressure and application rate.
6. Given the length of calibration run, swath width, and gallons of mix or pounds of granules applied, calculate the spray rate (liquid) or application rate (granular).

Task II. Calculate amount of product needed per given area or per application (e.g., to a tree).
Knowledge and Skills
a. Skill at basic arithmetic
b. Skill at converting units of measure
c. Skill at reading job-related materials (e.g., pesticide label)
Performance Objectives
1. Given the spray rate (volume of mix per unit area) and the area to be treated, calculate how much spray mix you will need.
2. Given the spray rate and tank capacity, calculate how much area a full tank can treat.
3. Given the application rate (amount of pesticide product per unit area or per volume of spray mix) and either the area to be treated or the amount of spray mix needed, calculate how much pesticide product you will need.
4. Given a granular application rate and the square footage to be treated, calculate how much pesticide product you will need.
5. Convert application rates from units of product/mix per acre to per 1000 square feet and vice versa.
6. Describe the relationship between tree DBH (diameter at breast height) and application rates (e.g., for soil drench, trunk injection).

Task III. Mix/load pesticide products.
Knowledge and Skills
a. Skill at reading job-related materials
b. Knowledge of ideal mix/load locations (e.g., mix pads, backflow protection, [your state's] regulations regarding mixing/loading sites)
c. Knowledge of equipment function (e.g., agitation)
d. Knowledge of proper procedures for loading granules
e. Knowledge of proper tank mix sequence and procedures
f. Knowledge of spray adjuvants
g. Knowledge of PPE requirements
h. Knowledge of company policy
Performance Objectives
1. Identify features of a suitable site for mixing and loading pesticides, including any requirements imposed by [your state's] regulations.
2. Describe the purpose of backflow prevention between a water source and a spray tank (e.g., air gap, antisiphon device, dedicated water tank).
3. Describe precautions to take when mixing and loading pesticides at a customer's property.
4. Describe the procedures to follow when mixing one or more pesticides in a spray tank.

Task IV. Manage pesticide product containers (e.g., triple rinsing, disposal, storage).
Knowledge and Skills
a. Knowledge of triple rinsing
b. Knowledge of proper procedures to completely empty bags
c. Knowledge of proper container labeling
d. Knowledge of [your state's] service container rules

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e. Knowledge of proper storage practices  
f. Knowledge of proper empty container disposal practices (including recycling options)

Performance Objectives
Core content—omitted from category examination

Task V. Confirm application site.
Knowledge and Skills
a. Skill at reading job-related materials  
b. Skill at map reading  
c. Skill at using GPS  
d. Skill at verbal communication  
e. Skill at identifying property lines  
f. Skill at identifying woody plants  
g. Knowledge of company policy regarding contacting customer prior to application

Performance Objectives
1. List ways in which you can confirm that you are at the intended site of application.  
2. Discuss steps to take if asked to apply pesticide spray to a tree that is only partially located on the customer's property.

Task VI. Position/stage application equipment for treatment.
Knowledge and Skills
a. Skill at equipment operation  
b. Knowledge of human and vehicle traffic flow at the application site  
c. Knowledge of environmental hazards at the application site (e.g., storm drains)  
d. Knowledge of how terrain/physical obstacles impact equipment operation

Performance Objectives
1. Describe how people, pets, and man-made structures in and near the application site can influence staging decisions.  
2. List steps you can take to protect people and prevent spills when staging application equipment and service vehicles.  
3. Describe how terrain can influence whether or not you treat an area and, if so, how you choose to do it (e.g., pesticide product, application equipment).  
4. Describe how terrain, obstacles, and site conditions can affect how you maneuver spray equipment to make an application.

Task VII. Apply pesticide to target.
Knowledge and Skills
a. Skill at reading job-related materials (e.g., pesticide label, equipment manuals)  
b. Skill at equipment operation
c. **Skill at placing product properly** (e.g., overlap on turf, to “wet” or “drip” for ornamentals, etc.)

d. **Knowledge of equipment types and function**

e. **Knowledge of how pesticides move off site** (e.g., runoff, drift, volatilization)

f. **Knowledge of techniques to minimize spray drift**

**Performance Objectives**

1. Describe the procedure for making a uniform application to turf using a:
   a) Hose reel sprayer.
   b) Ride-on boom sprayer.
   c) Rotary spreader.
   d) Handheld or backpack sprayer.

2. Describe the procedures (including site preparation and equipment selection) for making the following applications to a tree or woody ornamental:
   a) Soil drench
   b) Soil injection
   c) Trunk injection
   d) Spray using a handheld or backpack sprayer
   e) Spray using a hose reel sprayer

3. Tell what a pesticide label means when it says to apply a spray "to wet" or "to runoff" to a tree or other ornamental plant.

4. Explain how the age, size, and type of woody ornamental affects how you apply pesticide to achieve the goal of spraying "to wet."

5. Given an insect pest or plant pathogen, tell where you should direct a pesticide (e.g., to root zone, top of leaf).

6. Describe when and how to make a cut-stump treatment.

7. Explain how relative humidity and rain can help a pesticide reach its target.

8. Explain why you need to irrigate turf after applying some pesticide products.

9. Tell how Siphonex and Atomist operate and when they are used.

10. Explain how a herbicide used in a cut-stump treatment could harm nearby turf or trees and what you can do to prevent it.

11. When making a turf application with a hose reel sprayer, tell what adjustments you can make in your technique to prevent drift or overspray.

**Task VIII. Monitor application equipment during treatment** (e.g., leaks, nozzle performance).

**Knowledge and Skills**

a. **Skill at equipment operation**

b. **Knowledge of equipment types and proper function**

c. **Knowledge of nozzle spray patterns**

d. **Knowledge of common equipment problems**
Performance Objectives
1. For a given piece of spray equipment, explain how agitation is maintained during an application.
2. Describe ways you can tell if you are getting even coverage during a pesticide application.
3. Give examples of equipment problems that occur during an application, including how you can tell something is wrong and how you fix the problem.

Task IX. Respond to off-target movement (e.g., spills, granules on walks/drives).
Knowledge and Skills
a. Skill at recognizing changing environmental conditions (e.g., wind, rain, temperature)
b. Knowledge of spill response procedures
c. Knowledge of overspray
Performance Objectives
1. State what must be done with granular turf products that contact sidewalks, driveways, walks, and curbs.

Task X. Adjust work assignment as conditions change (e.g., environmental).
Knowledge and Skills
a. Skill at recognizing changing environmental conditions (e.g., wind, rain, temperature)
b. Knowledge of real-time site conditions
c. Knowledge of how pesticides move off site (e.g., runoff, drift, volatilization)
d. Skill at evaluating risks to nontarget organisms (e.g., bees)
Performance Objectives
Addressed under Duty C, Task XV

Task XI. Communicate with supervisor (or those you supervise).
Knowledge and Skills
a. Skill at using communication devices
b. Skill at verbal communication
c. Knowledge of [your state's] rules regarding direct supervision
d. Knowledge of company policy
Performance Objectives
Addressed under Duty C, Task VI
Job Duty E: Perform Post-Application Procedures (9%)

Task I. Compare amount of pesticide product(s) applied with size of site treated.
   Knowledge and Skills
   a. Skill at basic arithmetic
   b. Skill at recognizing when to recalibrate
   c. Skill at verbal communication
   d. Knowledge of company policy (e.g., action to take if incorrect amount of product applied)
   Performance Objectives
   1. Given a liquid spray rate, area treated, and amount of liquid remaining in the spray tank, estimate application accuracy.
   2. Given a dry application rate, area treated, and amount of dry product remaining in the hopper, estimate application accuracy.

Task II. Post (treatment site) and notify (customer) as needed.
   Knowledge and Skills
   a. Skill at written communication
   b. Skill at verbal communication
   c. Knowledge of [your state's] posting and customer notification requirements (e.g., for residences, schools, golf courses)
   d. Knowledge of customer’s role in pest management
   Performance Objectives
   1. Give examples of post-application instructions you can give to customers to help ensure their safety and the success of the application.

Task III. Dispose of empty pesticide bags and small containers.
   Knowledge and Skills
   a. Knowledge of proper empty container disposal practices
   Performance Objectives
   Core content—omitted from category examination

Task IV. Manage leftover pesticide spray mix or product(s).
   Knowledge and Skills
   a. Skill at reading job-related materials
   b. Knowledge of how to properly handle leftover pesticide products
   c. Knowledge of proper pesticide product storage practices
   d. Knowledge of factors that affect the efficacy of stored pesticide spray mix
   e. Knowledge of how to properly handle leftover spray mix
f. Knowledge of [your state’s] service container rules (e.g., labeling sprayers)
g. Knowledge of company policy (e.g., regarding storage of leftover spray mix)

Performance Objectives
1. Give reasons why it’s preferable to avoid leaving spray mix in a tank overnight.

Task V. Clean application equipment.
Knowledge and Skills
a. Skill at reading job-related materials
b. Skill at equipment operation
c. Knowledge of ideal equipment-cleaning site characteristics
d. Knowledge of procedures for cleaning application equipment
e. Knowledge of equipment-cleaning products
f. Knowledge of how to properly handle rinse water

Performance Objectives
1. Give reasons why it is important to clean out application equipment.
2. Identify features of a site suitable for washing application equipment.
3. List general procedures for cleaning the interior and exterior of application equipment (including what to do with the rinse water).

Task VI. Maintain personal protective equipment (PPE).
Knowledge and Skills
a. Knowledge of proper PPE cleaning and storage practices
b. Knowledge of when to inspect PPE
c. Knowledge of when and how to dispose of PPE

Performance Objectives
Core content—omitted from category examination

Task VII. Repair application equipment (including routine maintenance).
Knowledge and Skills
a. Skill at equipment operation
b. Skill at equipment maintenance
c. Skill at reading job-related materials
d. Knowledge of common equipment problems

Performance Objectives
1. List sprayer maintenance and storage procedures that help prevent leaks and other forms of equipment breakdown.
2. Describe the procedures for correcting or replacing nozzles that are producing a bad spray pattern.
3. Describe problems that can develop with the gun and hose of a hose reel sprayer and how you can correct those problems.

Task VIII. Maintain application records.

Knowledge and Skills
a. Skill at written communication
b. Skill at reading job-related materials
c. Knowledge of [your state's] recordkeeping requirements (including any special requirements for applications of particular pesticides or to schools, golf courses, etc.)
d. Knowledge of company policy

Performance Objectives
1. With respect to [your state's] recordkeeping requirements, explain what constitutes a single application (e.g., is treating 18 greens on a golf course one application or 18?).
2. Identify the timeframe (according to [your state's] regulations) in which you must fill out an application record after completing a pesticide application.
3. List and explain the benefits of types of information (in addition to those required by [your state's] laws) that can be good for you to include when you make an application record.

Task IX. Respond to customer/public inquiries.

Knowledge and Skills
a. Skill at verbal communication
b. Skill at written communication
c. Knowledge of [your state's] customer notification requirements
d. Knowledge of the importance of the pesticide label
e. Knowledge of company policy
f. Knowledge of reliable sources of technical information
g. Knowledge of basic ornamental and turf product characteristics
h. Skill at recognizing symptoms of phytotoxicity (e.g., in cases of suspected drift)
i. Knowledge of benefits of ornamental and turf plant management

Performance Objectives
1. List things an applicator can say and/or do to assure an individual who approaches him or her with concerns about an application.
2. Explain how the product label and/or [your state's] customer notification requirements can affect whether or not you consent to a customer's request for a particular application (e.g., must add to contract first, can't spray closer to water than label allows, etc.).
3. List print and online sources where you can get reliable information on pests and on the pesticides you use.
4. Recognize symptoms of herbicide injury to desirable plants.
5. List the benefits of managing pests in turf, landscapes, and interiorscapes.
Task X. **Evaluate treatment effectiveness.**

Knowledge and Skills

a. *Skill at evaluating condition of desirable plants*
b. *Skill at evaluating pesticide efficacy*
c. *Knowledge of why pesticide applications can fail*
d. *Skill at written communication*
e. *Skill at verbal communication*
f. *Skill at reading job-related materials*

Performance Objectives

1. Discuss how you would determine the cause of a treatment failure (e.g., pesticide resistance vs. applicator error).
Job Duty F: Participate in Professional Development (8%)

Task I. Maintain applicator credentials.
Knowledge and Skills
   a. Knowledge of [your state’s] recertification requirements
Performance Objectives
   1. State the length of your commercial pesticide applicator [certification /license] term.
   2. State what you must do during the [certification / license] term in order to recertify.

Task II. Read professional literature.
Knowledge and Skills
   a. Skill at reading job-related materials
   b. Knowledge of reliable sources of technical information
Performance Objectives
   Addressed under Duty E, Task IX

Task III. Attend professional education programs.
Knowledge and Skills
   a. Knowledge of available resources for locating professional programs
Performance Objectives
   1. Identify sources for locating programs approved for pesticide applicator continuing education credit.

Task IV. Conduct/attend in-house training.
Knowledge and Skills
   a. Skill at verbal communication
   b. Knowledge of reliable sources of technical information
Performance Objectives
   Not testable

Task V. Participate in professional associations.
Knowledge and Skills
   a. Skill at verbal communication
   b. Skill at written communication
Performance Objectives
   Not testable
Task VI. Consult proactively with state Cooperative Extension Service (CES) and regulatory agencies.

Knowledge and Skills

a. Skill at verbal communication
b. Knowledge of the function of state CES and regulatory agencies

Performance Objectives

Core content—omitted from category examination