

Alaska Limited Vertebrate Pest Control for Predators Manual



Category Seventeen C

In general, applicators who apply pesticides to property other than their own must obtain certification from the Alaska Department of Environmental Conservation (ADEC) Pesticide Program. Applicators who apply restricted-use pesticides, regardless of location, must also be certified.

Category Seventeen C, Limited Vertebrate Pest Control for Predators, is intended for individuals who apply cyanide ejectors or sodium fluoroacetate collars for predator control.

The information needed to successfully complete the written core examination required for all certified pesticide applicators in Alaska includes:

1. National Pesticide Applicator Certification Core Manual;
2. Alaska Core Manual; and
3. State of Alaska Pesticide Regulations in Title 18, Chapter 90 of the Alaska Administrative Code (18 AAC 90)

The information needed to successfully complete the Category Exam in Category Seventeen C in Alaska is provided in this Alaska Manual.

Prior to taking the Category Exam for 17 C, prospective applicators must provide documentation that they attended a training session (described below).

LEARNING OBJECTIVES

M-44

- List which animals may be controlled using an M-44 device.
- Explain the circumstances under which these animals may be targeted.
- Describe how an M-44 ejector device works.
- Explain which agency must oversee the use of M-44 pesticides.
- List the four areas of training required for use of M-44 pesticides.
- Describe the areas where M-44 devices may not be used.
- Explain who must know the exact location of each M-44 device.
- How far from a trail must an M-44 device be located?
- What is the maximum allowable density for placement of M-44 devices?
- How often do M-44 devices need to be inspected?
- When must M-44 devices be removed?
- Describe the required content and location of M-44 warning signs.
- Describe the medical precautions that must be taken, when working with M-44 pesticides.
- List the six additional recordkeeping items that must be kept related to the use of M-44 pesticides.

LPCs

- List which animals may be controlled using an LPC.
- Explain the circumstances under which these animals may be targeted.

- Describe how an LPC works.
- List the four areas of training required for use of LPCs.
- List the six additional recordkeeping items that must be kept related to the use of LPCs.
- Describe the notification requirements for any non-target poisoning from LPCs.
- Explain who may fill collar reservoirs with Compound 1080 solution.
- Describe the areas where LPCs may be used.
- Describe the required content and location of LPC warning signs.
- How often do LPCs need to be inspected?
- Describe the required actions if LPC collars are not accounted for.
- What is the maximum number of LPCs allowed for different pasture sizes?

CALCULATIONS

Precise and accurate application is important for every pesticide application. However, for this category, only basic math skills are required and will be tested. Calculations required for correct application of these type of predacides are generally less complex. To ensure you can pass the calculations portion of the Category Seventeen C Exam, you will need to carefully review pages 164-165, and 190-192 in the National Core Manual. Additional resources for pesticide applicator math are available from the Purdue Pesticide Program at <https://ag.purdue.edu/departments/extension/ppp/>.

SODIUM CYANIDE EJECTORS (M-44)

The M-44 ejector is a spring-activated device that delivers a dose of cyanide powder directly into the mouth of targeted animals. M-44 products are intended to control only coyotes, foxes, and feral dogs. In Alaska there are numerous predators. Identifying what predator killed an animal is crucial to determining if the M-44 is the appropriate method of control.

The M-44 consists of a base that is placed in the ground to contain the ejector, the capsule holder, a capsule containing sodium cyanide, and an ejector mechanism with a spring-driven plunger that expels the sodium cyanide capsule contents. The capsule holder is wrapped with absorbent material that contains an attractant scent and protrudes above the ground. When the animal pulls on the fabric, the ejector is triggered and sodium cyanide is ejected into the animal's mouth.

Sodium cyanide quickly reacts with moisture in the animal's mouth, releasing hydrogen cyanide gas, which prevents oxygen flow to the blood. Death occurs within five minutes.

Hydrogen sulfide can kill a human being at a concentration of 200 ppm. Amyl nitrate is an effective antidote if used quickly after exposure. Non-target animals, including pet dogs or wolves, can be poisoned, and may be drawn by the attractant used on the device.

There are currently only a very few M-44 products registered with EPA:

- EPA registration number 56228-15 is registered for control of coyotes, foxes, and feral dogs that prey upon livestock and poultry, prey upon federally designated Threatened or Endangered species, or are vectors of communicable disease.
- EPA registration number 56228-32 is registered for control of arctic foxes that prey on threatened or endangered species in the Aleutian Islands of Alaska.
- There are a few other products registered just for use in specific states.
- No M-44 product is currently registered for distribution in Alaska (as of August 2017).

All M-44 products are classified as a Restricted Use Pesticides. The products may only be used by trained, certified applicators who are supervised by USDA APHIS¹ Wildlife Services. The products must be used in accordance with 26 use restrictions, which are specified in EPA's bulletin "M-44 Use Restrictions", dated October 7, 2010 (attached below).

SODIUM FLUROACETATE COLLARS (LIVESTOCK PROTECTION COLLARS)

Livestock Protection Collars (LPCs) have two rubber reservoirs containing a solution of sodium fluoroacetate, also called Compound 1080, that delivers the dose of poison directly into the mouth of targeted animals who bite the necks of the livestock wearing the collars. LPCs are intended to control only coyotes that attack sheep or goats.

In Alaska there are numerous predators. Identifying what predator killed an animal is crucial to determining if the LPC is the appropriate and legal method of control. ONLY coyotes may be controlled by LPCs.

Compound 1080 is absorbed in the gastrointestinal tract, where it blocks the Krebs cycle, the process by which individual cells generate energy. Death occurs within 24 hours from cardiac arrest or central nervous system failure.

The toxicity of Compound 1080 varies between animal species. It has a greater toxicity to mammals, with canids among the most sensitive species. Due to the use of this product only within sealed bladders on Livestock Protection Collars, chances of exposure to nontarget species is limited to other predators who might attack sheep or goats. In Alaska, this would include wolves, bears, and possibly pet dogs.

There are currently only a very few LPCs registered with EPA:

- EPA registration number 56228-22 is registered for control of coyotes that prey upon goats or sheep.
- There are a few other products registered just for use in specific states.
- No LPCs are currently registered for distribution in Alaska (as of August 2017).

All Compound 1080 products are classified as a Restricted Use Pesticides. The products may only be used by trained, certified applicators. The products must be used in accordance with 18

¹ United States Department of Agriculture, Animal and Plant Health Inspection Service

use restrictions, which are specified in EPA's technical bulletin for the Sodium fluoroacetate (Compound 1080) Livestock Protection Collar, dated February 2017.

ANIMALS RELATED TO THESE CONTROLS IN ALASKA

Sodium cyanide ejectors and sodium fluoroacetate collars are designed to control a very specific and limited number of predators. These include coyotes, red fox, grey fox, arctic fox, and wild dogs. All are members of the dog family (Canidae).

Coyotes: Coyotes are medium sized canines, averaging 22-33 pounds, and two feet high at the shoulder. They are grey or light brown with a long, bushy tail. They primarily feed on snowshoe hares, voles, and carrion. The highest densities of coyotes in Alaska occur in the Kenai Peninsula, the Matanuska and Susitna Valleys, and the Copper River Valley.

Red Fox: Red fox are small canines, averaging 6-15 pounds. Red foxes are typically red in color, with a white-tip on the long, bushy tail. However, there are many color variations, including a light yellowish, black, or silver-tipped black; all have the white tip on the tail. Red fox primarily eat voles, but may also eat many other types of small animals, insects, vegetation, or carrion. Red foxes are found throughout Alaska. These foxes are susceptible to canine distemper and rabies.

Arctic Fox: Arctic fox are small canines, averaging 6-10 pounds. Most are pure white in the winter, and brown in the summer. Some arctic fox remain a dark, charcoal gray year-round. They primarily feed on lemmings and voles but may also prey on nesting birds or carrion. They tend to migrate seasonally over large distances. Arctic fox are found in treeless coastal areas across Alaska. These foxes are susceptible to canine distemper and rabies. They were introduced to some coastal islands, where they impacted nesting seabirds. As a result, an eradication program was operated for many years to rid these islands of arctic fox.

Grey Fox: Grey fox do not occur in Alaska.

Wild dogs: Wild dogs may occur in Alaska. These are stray pet dogs or their descendants that have become feral. Feral dogs feed on carrion and garbage around human habitation. They may also prey on other dogs or animals. Wild dogs are susceptible to canine distemper and rabies, and are also responsible for a large number of dog bites in Alaska each year.

Wolves: Wolves are specifically not listed as target animals on any of the pesticide products addressed under this category. Since wolves are a top predator in most locations, chances of accidentally impacting a wolf with these controls are very high.

Bears: Bears (both black and brown) are specifically not listed as target animals on any of the pesticide products addressed under this category. Since bears are a top predator in most locations, chances of accidentally impacting a bear with these controls are very high.

Livestock: Alaska ranks 49th out of 50 states, or 50th out of 50 states in every measure of the number or value of livestock, including specific categories for sheep and goats². The likelihood is very low that targeted predators (foxes, coyotes, and wild dogs only) would impact the limited number of livestock in Alaska. It is more likely that these products would be used to control foxes or coyotes for preying on threatened or endangered species, or because they are vectors of disease.

REQUIRED TRAINING

Both the M-44 and the Compound 1080 bulletins require that applicators receive specific training on safe handling, proper use, use of antidotes, and product specific record keeping requirements. Unfortunately, training programs are not available in Alaska. Applicators wishing to receive certification in this category in Alaska will be required to provide documentation of training prior to taking the Category Exam.

EPA USE RESTRICTION BULLETIN FOR M-44

M-44 product labels provide typical label instructions, but also require applicators and handlers to comply with the EPA's Use Restriction Bulletin for these products. This bulletin includes 26 specific restrictions for handling and use of these products.

1. Use of the M-44 device shall conform to all applicable federal, state and local laws and regulations.
2. Applicators shall be subject to such other regulations and restrictions as may be prescribed from time-to-time by the U.S. Environmental Protection Agency (EPA).
3. Each applicator of the M-44 device shall be trained in: (1) safe handling of the capsules and device, (2) proper use of the antidote kit, (3) proper placement of the device, and (4) necessary record keeping.
4. M-44 devices and sodium cyanide capsules shall not be sold or transferred to, or entrusted to the care of any person not supervised or monitored by Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS), or any agency not working under a WS cooperative agreement.
5. The M-44 device shall only be used to take wild canids:
 - (1) suspected of preying on livestock or poultry;
 - (2) suspected of preying on federally designated threatened or endangered species; or
 - (3) that are vectors of a communicable disease.
6. The M-44 device shall not be used solely to take animals for the value of their fur.
7. The M-44 device shall only be used on or within seven miles of a ranch unit or allotment where losses due to predation by wild canids are occurring or where losses can be reasonably expected to occur based upon recurrent prior experience of predation on the ranch unit or allotment. Full documentation of livestock depredation, including evidence that such losses were caused by wild canids, will be required before applications of the M-

² USDA 2024 State Agricultural Overview,
https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=ALASKA

44 are undertaken. This use restriction is not applicable when wild canids are controlled to protect federally designated threatened or endangered species or are vectors of a communicable disease.

8. The M-44 device shall not be used:
 - (1) in areas within national forests or other federal lands set aside for recreational use,
 - (2) in areas where exposure to the public and family and pets is probable,
 - (3) in prairie dog towns, or
 - (4) except for the protection of federally designated threatened or endangered species, in national or state parks, national or state monuments, federally designated wilderness areas and wildlife refuge areas.
9. The M-44 device shall not be used in areas where federally listed threatened or endangered animal species might be adversely affected. Each applicator shall be issued a map, prepared by or in consultation with the U.S. Fish and Wildlife Service, which clearly indicates such areas.
10. One person other than the individual applicator shall have knowledge of the exact placement location of all M-44 devices in the field.
11. In areas where more than one governmental agency is authorized to place M-44 devices, the agencies shall exchange placement information and other relevant facts to ensure that the maximum number of M-44s allowed is not exceeded.
12. The M-44 device shall not be placed within 200 feet of any lake, stream, or other body of water, provided that natural depression areas which catch and hold rainfall for short periods of time shall not be considered "bodies of water" for purposes of this restriction.
13. The M-44 device shall not be placed in areas where food crops are planted.
14. The M-44 device shall be placed at least at a 50-foot distance or at such a greater distance from any public road or pathway as may be necessary to remove it from sight of persons and domestic animals using any such public road or pathway.
15. The maximum density of M-44s placed in any 100-acre pasture land areas shall not exceed 10; and the density in any one square mile of open range shall not exceed 12.
16. No M-44 device shall be placed within 30 feet of a livestock carcass used as a draw station. No more than four M-44 devices shall be placed per draw station and no more than five draw stations shall be operated per square mile.
17. Supervisors of applicators shall check the records, warning signs, and M-44 devices of each applicator at least once a year to verify that all applicable laws, regulations, and restrictions are being strictly followed.
18. Each M-44 device shall be inspected at least once every week, weather permitting access, to check for interference or unusual conditions and shall be serviced as required.
19. Damaged or nonfunctional M-44 devices shall be removed from the field.
20. An M-44 device shall be removed from an area if, after 30 days, there is no sign that a target predator has visited the site.
21. All persons authorized to possess and use sodium cyanide capsules and M-44 devices shall store such capsules and devices under lock and key.
22. Used sodium cyanide capsules shall be disposed of by deep burial or at a proper landfill site. Incineration may be used instead of burial for disposal. Place the capsules in an incinerator or refuse hole and burn until the capsules are completely consumed. Capsules may be incinerated using either wood or diesel fuel.

23. Bilingual warning signs in English and Spanish shall be used in all areas containing M-44 devices. All such signs shall be removed when M-44 devices are removed.
 - a. Main entrances or commonly used access points to areas in which M-44 devices are set shall be posted with warning signs to alert the public to the toxic nature of the cyanide and to the danger to pets. Signs shall be inspected weekly to ensure their continued presence and ensure that they are conspicuous and legible.
 - b. An elevated sign shall be placed within 25 feet of each individual M-44 device warning persons not to handle the device.
24. Each authorized or licensed applicator shall carry an antidote kit on his person when placing and/or inspecting M-44 devices. The kit shall contain at least six pearls of amyl nitrite and instructions on their use. Each authorized or licensed applicator shall also carry on his person instructions for obtaining medical assistance in the event of accidental exposure to sodium cyanide.
25. In all areas where the use of the M-44 device is anticipated, local medical people shall be notified of the intended use. This notification may be through a poison control center, local medical society, the Public Health Service, or directly to a doctor or hospital. They shall be advised of the antidotal and first-aid measures required for treatment of cyanide poisoning. It shall be the responsibility of the supervisor to perform this function.
26. Each authorized M-44 applicator shall keep records dealing with the placement of the device and the results of each placement. Such records shall include, but need not be limited to:
 - a. The number of devices placed.
 - b. The location of each device placed.
 - c. The date of each placement, as well as the date of each inspection.
 - d. The number and location of devices which have been discharged and the apparent reason for each discharge.
 - e. Species of animals taken.
 - f. All accidents or injuries to humans or domestic animals.

EPA USE RESTRICTION BULLETIN FOR COMPOUND 1080

Compound 1080 product labels provide typical label instructions, but also require applicators and handlers to comply with the EPA's Bulletin for these products. This bulletin includes 18 restrictions as well as information for correct handling and use of these products.

Use Restriction 1

Use of LP Collars shall conform to all applicable Federal, State and local regulations.

Use Restriction 2

LP Collars shall be sold or transferred only by registrants or their agents and only to certified Livestock Protection Collar applicators. Collars may be used only by specifically certified Livestock Protection Collar applicators or by persons under their direct supervision³.

³ NOTE – in Alaska, all application of RUPs must be made by certified applicators. Application by non-certified individuals is not allowed, even under direct supervision.

The certified applicator is directly responsible for assuring that all use restrictions are met. The certified applicator will decide, in accordance with label directions, when and under what circumstances LP Collars will be used. The certified applicator will either apply collars or be physically present where collars are applied by a noncertified person. However, a noncertified person who has received adequate instructions from the certified applicators may store collars, check collars in the field, remove collars, repair or dispose of damaged collars in accordance with use restrictions, retrieve collars lying in the field, and properly dispose of contaminated material and animal carcasses.

Use Restriction 3

Certification of applicators shall be performed by appropriate regulatory agencies. Prior to certification, each applicator shall receive training which will include, but need not be limited to:

- a. Training in safe handling and attachment of LP Collars.
- b. Training in disposal of punctured or leaking LP Collars, and contaminated animal remains, vegetation, soil, and clothing.
- c. Instructions for practical treatment of Compound 1080 in human and domestic animals.
- d. Instructions on record keeping.

Use Restriction 4

Registrants or their agents shall keep records of all collars sold or transferred at their address of record. Records shall include the name, address, state where LP Collar certification was issued, certification number of each recipient, and dates and numbers of collars sold or transferred.

Use Restriction 5

Each applicator shall keep records dealing with the use of LP Collars and the results of such use. Records shall be maintained in accordance with appropriate State or Federal regulations but for not less than two years following disposal or loss of collars. Such records shall include, but need not be limited to:

- a. The number of LP Collars attached on livestock.
- b. The pasture(s) where LP collared livestock were placed.
- c. The dates of each attachment, inspection, and removal.
- d. The number and locations of livestock found with ruptured or punctured LP Collars and the apparent cause of the damage.
- e. The number, dates, and approximate location of LP Collars lost.
- f. The species, locations, and dates of all suspected poisonings of humans, domestic animals, or non-target wild animals resulting from LP Collar use.

Use Restriction 6

Any suspected poisoning of threatened or endangered species must be reported immediately, within three days, to the Environmental Protection Agency, as will each suspected poisoning of humans, domestic animals or non-target wild animals. The person to contact at the Environmental Protection Agency is Branch Chief, Invertebrate and Vertebrate Branch 3, Registration Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, 1250 Pennsylvania Avenue, NW, Washington, DC 20460.

Use Restriction 7

Only the registrant or collar manufacturer is authorized to fill LP Collars with Compound 1080 solution. Certified applicators are not authorized to fill LP Collars. Compound 1080 solution may not be removed from collars and used for any other purpose.

Use Restriction 8

LP Collars shall only be used to take coyotes within fenced pastures no larger than 2,560 (4 square miles). But where average annual precipitation does not exceed 20 inches and vegetation is sparse, consisting only of short to mid-height grasses and scattered shrubs, collars may be used in pastures up to a maximum of 10,000 acres (16 square miles) in size.

In no case shall the applicator place LP collared livestock in pastures where compliance with other Use Restrictions, such as monitoring, is impossible; in fenced pastures larger than 10,000 acres; or in unfenced, open range.

Use Restriction 9

LP Collars shall be used only where losses of sheep or goats due to predation by coyotes are occurring or, based upon prior experience, where coyote predation can reasonably be expected to occur.

Use Restriction 10

Where LP Collars are in use, each logical point of access (for example, roads, gates, and trails), shall be conspicuously posted with a bilingual (English/Spanish or other second language appropriate for the region) warning sign not less than 8"x10" in size. Signs shall be inspected weekly to ensure their continued presence and legibility and will be removed when collars are removed. The signs will have a minimum type size for "DANGER-POISON" of 24 point (1/4 inches), with remaining text at least 18 point (3/16 inches).

Use Restriction 11

All LP collared livestock must be checked at least once every seven days and collars adjusted if needed.

If any LP collared animal is not accounted for in two consecutive checks, an intensive search for it must be made.

In addition, if more than three LP collared animals are not accounted for during any one check, an intensive search for these animals is required.

If more than nine (9) LP Collars are unaccounted for during any 60-day period, remove all collars from animals and terminate their use. Do not resume until adequate steps have been taken to prevent further, excessive loss of collars.

Use Restriction 12

Damaged, punctured, or leaking LP Collars shall be removed from the field for repair or proper disposal. Damaged collars shall be placed individually in leak proof containers while awaiting repair or proper disposal. Authorized collar repairs are limited to minor repairs of straps and fastenings. Leaking or punctured collars must be properly disposed.

Use Restriction 13

Dispose of Compound 1080 wastes (punctured, leaking, or otherwise unrepairable LP collars; contaminated leather clothing, animal remains, wool, hair, vegetation, water, and soil) under three feet of soil, at a safe location, preferably on property owned or managed by the applicator and at least ½ mile from human habitations and water supplies. No more than 10 collars may be buried in any one hole. If buried in a trench, each group of 10 collars must be at least 10 feet apart.

Incineration may be used instead of burial for disposal in the field (preferably on property owned or managed by the applicator) at least ½ mile from human habitation and water supplies. Place collars and wastes (listed above) in an incinerator or refuse hole, saturate with diesel fuel, and ignite. Attend the burn until the contaminated material is completely consumed.

Alternatively, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest U.S. EPA Regional Office for guidance in disposing of wastes at approved hazardous waste disposal facilities.

When snow or frozen ground make on-site disposal impractical, up to one cubic foot of wastes may be stored in a leak-proof container, in a dry, locked place for 90 days.

Compound 1080 containers are nonrefillable. Do not reuse or refill containers. Offer for recycling, if available.

Metal containers: Triple rinse contaminated and uncontaminated container with water promptly after emptying. If container is not to be recycled, puncture and dispose of contaminated containers and rinsate, as above.

Plastic containers: Triple rinse with water promptly after emptying. If the container is not to be recycled, puncture and dispose of container and rinsate, as above.

Use Restriction 14

All persons authorized to possess and use LP Collars shall store them under lock and key in a dry place away from food, feed, domestic animals, and corrosive chemicals, and in outbuildings, or in outdoor storage areas attached to but separate from human living quarters.

Use Restriction 15

Provisions for protection of endangered species:

The LP Collar may not be used in the following areas due to potential adverse effects to endangered species (California condor).

State	Counties
California	Fresno, Kern, Kings, Los Angeles, Monterey, San Benito, San Luis Obispo, Santa Barbara, Tulare and Ventura

The LP Collar may not be used in the following areas without written approval from the nearest U.S. Fish and Wildlife Service Office (FWS, Endangered Species Specialists). If FWS or the user determines that use of collars may adversely impact an endangered species (San Joaquin kit fox, black-footed ferret, Northern Rocky Mountain wolf, or grizzly bear) in the specific areas requested, collars may not be used in these areas. Written approval must be obtained annually.

State	Counties or Area	Nearest FWS Office
California	Alameda, Contra Costa, Merced, San Joaquin, Santa Clara & Stanislaus	Sacramento 916-414-6464
Idaho	Bonner, Boise (north of State Hwy 21) Boundary, Clearwater, Custer (north of Local road running from Sun Valley to Chilly to Patterson), Fremont, Lemhi, Shoshone and Valley	Boise 208-378-5243
Michigan	Keweenaw (Isle Royal) and entire Upper Peninsula	Twin Cities, Minnesota 612-725-3548
Minnesota	Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Kittson, Koochiching, Lake, Lake Of the Woods, Mahnomen, Marshall, Pennington, Pine, Roseau, and St. Louis	Twin Cities, Minnesota 612-725-3548
Montana	Beaverhead, Carbon, Flathead, Gallatin, Glacier, Lake, Lewis and Clark, Lincoln, Madison, Missoula, Park, Pondera, Powell, Sanders, Stillwater, Sweet Grass & Teton	Helena 406-449-5225
Washington	Pend Oreille, Okanogan (National Park And Forest	Boise, Idaho 208-378-5243

	Land), Skagit and Whatcom	
Wisconsin	Douglas, Florence, Lincoln, Oneida and Price	Twin Cities, Minnesota 612-725-3548
Wyoming	Fremont, Park, and Teton and Yellowstone National Parks	Helena, MT 406-449-5225

Use Restriction 16

The number of LP Collars used shall be the minimum necessary for effective livestock protection. For pastures of the following size classes, do not use more collars than the number indicated.

Size (acres)	Number of Collars
Up to 100	20
101 to 640	50
641 – 10,000	100

Use Restriction 17

Consult the EPA-accepted container label for this product (Appendix A) for first aid information for what to do in case of exposure to Compound 1080 and emergency contact information.

Use Restriction 18

No contaminated animal will be used for food or feed.

Sources of Information

- APHIS predation management website: <https://www.aphis.usda.gov/operational-wildlife-activities/protect-livestock-from-predators>
- Alaska Department of Fish and Game species profiles, <http://www.adfg.alaska.gov/index.cfm?adfg=animals.main>

Before Using Any Pesticide

STOP

**All pesticides can be harmful to health
and environment if misused.**

**Read the label
carefully. Use only
as directed.**