April 2001

M-44 User Tips

TECH NOTE
Wildlife Services
APHIS
United States Department of Agriculture
Animal and Plant Health Inspection Service
Date 1 April 2001

M-44 User Tips

The M-44 Sodium Cyanide Ejector Mechanism

The spring-activated sodium cyanide ejector, known as the M-44 because of its 44-caliber (0.44-inch-diameter) cyanide capsule, has progressed through several model variations since it was introduced in the late 1960's. All M-44 equipment used by Wildlife Services (WS) personnel is manufactured by WS's Pocatello Supply Depot (PSD) in Pocatello, ID. The information in this technical note is intended to help WS employees who are trained and certified M-44 users achieve optimum results with their M-44 equipment.

The current M-44 ejector, designed by PSD manager Paul Edstrom in 1984, was introduced in January 1985. No other ejector model has been made at PSD since that date. The Edstrom ejector has a 3 1/3-inch-long body with no bottleneck. Capsule holders are stamped "U.S. GOVT." Edstrom-model ejectors are intended for use with the swaged-top stake, which is 6 inches long with an outside diameter (od) of 0.75 inch. This is the only M-44 stake available from PSD.

The standard M-44 ejector used by WS from the late 1960's through 1984 was called the Poteet model. It had a 3-inch-long body with bottleneck. Capsule holders were stamped "U.S." Poteet-model ejectors and capsule holders are no longer available from PSD, but much of this equipment is still in use. Poteet ejectors were designed for use with Leyerlytop stakes, which have a cast top riveted to the 0.70-inch-od stake tube. Most Leyerly stakes are 5 or 7 inches long. They are no longer manufactured.

In 1979, an improved M-44 device was introduced. It soon became known as the M-50 because of its larger, 50-caliber cyanide capsule. The M-50 ejector had a 4-inch-long body without a bottleneck. Capsule holders were stamped "U.S." Manufacture of M-50 ejectors, capsule holders, and capsules was discontinued in 1983. This equipment should not be used as its performance is poor compared to that of current M-44 equipment.

M-44 Cyanide Capsules

M-44 capsules contain a mixture of sodium cyanide and inert ingredients. The amount of sodium cyanide mixture in each capsule is approximately 0.97 gram (0.03 ounce). This includes 0.88 gram of sodium cyanide (active ingredient) and 0.09 gram of inert ingredients.

One of the inert ingredients is a marker that can be detected in or around the mouth of an animal killed by the M-44 device. Capsules made by PSD for use outside the WS program contain a marker of a different color than the color used by WS.

Both markers are usually easy to see in or around the mouth of animals killed by M-44's. If it is important to know whether or not a particular animal was killed by an M-44, a shortwave ultraviolet light (366 nm) should be used when marker particles are not visible to the unaided eye. With the animal specimen in a dark place, either marker will fluoresce under ultraviolet light even if it is not visible in daylight.

Capsule Storage

Waxed capsules are very susceptible to heat damage. Keep them at room temperature (70-75°F) in a dry place as much as possible. Avoid wide temperature fluctuations because capsules subject to repeated heating and cooling deteriorate faster than capsules kept at

a constant temperature.

If capsules deteriorate under the storage conditions you normally use, try keeping them with a desiccant such as silica gel in a water-tight jar (1- or 2-quart, wide-mouth canning jar with good, tight lid) or a small metal, military-type ammo can with a snapdown lid. One good desiccant is indicating Drierite, which changes color as it absorbs moisture. By looking at the color, you can tell when the Drierite is waterlogged. You can then dry it out in an oven. When dry, it returns to the original color and is then ready for reuse.

Sealants

M-44 cyanide capsules were sealed with beeswax from August 1983 to April 1989, when a better sealant, Scheel SC-100 Petroleum Hydrocarbon Wax, was adopted. All capsules made since April 1989 have the new sealant.

Carrying Capsules for Use in the Field

Do not carry large numbers of M-44 cyanide capsules in your vehicle. Take only enough each day for the number of M-44's you plan to set or check that day. Keep capsules in your vehicle out of sunlight and away from heat. Do not carry capsules in the glove box or in toolboxes, where extreme temperatures may occur.

Checking Capsules

Whenever you get new capsules or use capsules that have been in storage, inspect them for the following:

Caking- Tip a few capsules back and forth, or listen while shaking them, to see if contents are free flowing. If there is any doubt, open a few carefully and pour contents out. Contents should drop out freely. Any sticking or clumping means the cyanide has started to cake. Capsules with caked ingredients should not be used.

Overfull- As filled at PSD, capsules have an air space of about 1/10 inch below the top wad. Cyanide expands when it absorbs water. When capsules appear to be too full, moisture has probably gotten in through the seal. This may have happened even if the seal looks as good as new. Overfull capsules often will be partly caked. Check for caking as explained above.

Age- Check the date of manufacture as marked on each box of capsules. A date stamp that reads "08 95" means that the capsules were made in August 1995. Be aware when you change from one lot of capsules to another, and inspect each new lot for caking as described above. Try to use capsules within 6 months from date of manufacture. The older the capsules, the more likely they are to be caked or otherwise defective.

Undersize Capsule Holders- Capsule holders made before 1990 may have undersized bores. If capsules do not easily fit in your capsule holders, enlarge the bores by running a drill bit 15/32 of an inch in diameter through each one. Capsule holders made since 1990 have a larger inside diameter and do not need to be drilled out.

Capsule Labels- Each cyanide capsule has a warning label. The capsule should fit in the capsule holder without removing the label. If your capsules do not fit well, drill out the capsule holders as described above. Do not remove capsule labels.

Flare- Flare, or swelling of capsule mouths, is caused by chemical reaction between wax ingredients and plastic. The reaction is accelerated by heat. Check for flare by inserting capsules in a capsule holder. If they do not slide in easily, they are flared. Do not force them in as that will damage the seal. Get new capsules as soon as possible.

Ejectors

Lubrication and Cleaning

M-44 ejectors need to be clean and properly lubricated to work well. Grease or oil the trigger and plunger whenever you set an M-44. There are many good lubricants. The following have been recommended by experienced M-44 users: silicone spray lubricant, mineral oil, Triflow®, petroleum jelly, and light greases such as Lubriplate® No. 105 or FML-O (food machinery lubricant). Glycerine is not recommended. Use whatever works for you, but lubricate those ejectors.

Cyanide is the chief cause of corrosion that produces ejector malfunctions. Once an ejector is fired and gets cyanide in it, the ejector should be cleaned carefully with a wire brush and lubricated before it is reset.

Ejectors made since 1992 use a retaining pin, rather than metal washer and crimp, to hold the ejector spring in place. The retaining pin can be removed to take these ejectors apart for cleaning. Compress the spring from the bottom end of the ejector with a small screwdriver; then remove the pin with a needle-nose plier.

Frequency of Servicing

Set M-44's should be lubricated and reset at least once each month if they haven't been pulled. When servicing undisturbed units, carefully test pull some of them to confirm proper functioning.

Bottom Blowouts

Failure of the bottom crimp has been a problem with certain M-44 ejectors, particularly those made early in 1985. (These are the only current model ejectors that lack the internal, 0-ring shock absorber on the plunger.) If you have had this problem, inspect similar ejectors for evidence of crystallization. Crystallized metal will have a grainy appearance, and the bottom crimp may show cracks. Crystallized ejectors should not be used. Return them to PSD for replacement.

In 1992, the M-44 ejector was modified to eliminate the bottom crimp. Ejectors now have a retaining pin rather than a bottom crimp to hold the ejector spring in place. This modification has eliminated bottom blowouts.

Trigger Pull Force

The current M-44 ejector requires a stronger pull to discharge than did the pre-1985, Poteet model ejector. The harder pull results from a new, stronger spring. Several things can be done to reduce the trigger pull:

1. When cocking the ejector, do not push the trigger as far up as it will go. Instead, set it at right angle to the body center line, or set it by feel to avoid excessive sear engagement.

2. Lubricate the trigger and plunger.

3. Before using brand new ejectors, cock and snap (fire) each one 6 times. This will reduce pull force by 1 to 2 pounds (new model ejectors). When snapping ejectors, hold them against a block of wood or other solid object to avoid internal damage.

4. When closing the lock ring (after ejector is in the stake), position the lock ring loop over the trigger. With new model ejectors and stakes, doing this reduces the pull force by about 1 pound. [Note: This recommendation does not apply to the flat metal lock ring introduced in 1996.]

Ejector Pullouts

When lock ring loops are positioned over the ejector trigger, as described above, ejectors may be pulled out and carried off. Pullouts occur when a coyote or other target animal initially pulls and discharges the M-44. If another coyote comes along and pulls on the M-44 before it has been reset, the discharged ejector may be pulled out of the stake and carried away. Pullouts can be reduced by reshaping the trigger or by replacing the wire lock ring with the flat metal lock ring that became available in 1996.

On the M-44 ejector as issued, the outermost trigger segment (3/8-inch long) is parallel to the ground when the ejector is set. To reshape a trigger, clamp the ejector in a vise and bend the trigger end up to a vertical position.

Stakes

Trigger Notch

The trigger notch is too shallow on some M-44 stakes. This creates a hazard because the ejector can fire when the operator attempts to close the lock ring, which will not close due to insufficient clearance over the trigger. To correct this hazard, inspect the notch on all swaged-top stakes and use a chain saw file to deepen any notches that are too shallow. Alternatively, defective stakes can be returned to PSD for repair or replacement.

Driving Stakes

Never hammer directly on M-44 stakes as that will break or deform the tops. Instead, use a driving rod inside the stake. In hard ground, make a pilot hole first. Before driving, put gravel or a wood block in the stake to protect the bottom from damage. For current model, swaged-top stakes, good wood blocks can be made from 5/8-inch hardwood dowel. Saw it into 7/8-inch lengths.

Another good way to avoid stake damage is to use a driving tool. Put a rubber bumper, such as an automotive shock absorber bushing, on a bolt of whatever length and diameter is right for your stakes.

Keeping Dirt and Sand Out

A "dirt skirt" can be used to keep sand or soil from getting in the stake and interfering with ejector movement. The dirt skirt is a round, 2- or 3-inch-diameter piece of inner tube, cloth, or plastic with a half-inch hole in the center. To use, place cocked ejector in stake. Set the lock ring; then place the skirt on the ejector before you screw on the capsule holder. Cover the skirt with soil.

Safety

Make Safety a Habit

When setting M-44's, never put yourself in a position where cyanide will hit your face or eyes if the unit discharges accidentally. Work on the upwind side and do not stand or kneel over the ejector.

A small pill vial, plastic bag, or thumb from a leather glove, when placed over the capsule holder, is a good safety precaution to confine ejected cyanide if the unit accidentally discharges while you are working on it.

Antidote Kits

Check expiration date to be sure your kit is current. Keep it on your person at all times while setting or servicing cyanide ejectors. Do not leave your antidote kit on the vehicle's dashboard or any other place where it will be exposed to excessive heat. Heating can cause amyl nitrite ampules to explode, thereby creating a health hazard to persons or animals exposed to the fumes.

Sources of Information

Additional information on this product can be found in the April 1994 ADC Final Environmental Impact Statement (Appendix P), in Material Safety Data Sheets supplied by the Pocatello Supply Depot, and in the 1995 Handbook on Prevention and Control of Wildlife Damage. Specific information on this product can be obtained through the National Wildlife Research Center (NWRC) (970-266-6000) or through the NWRC web site http://www.aphis.usda.gov/ws/nwrc. For further information about the availability of this product, contact your WS State Director, or the Pocatello Supply Depot.