

SHENANDOAH NATIONAL PARK

NATURAL RESOURCE MANAGEMENT



FIELD GUIDE FOR THE
CAPTURE, DRUG IMMOBILIZATION, AND
TRANSPORTATION
OF WILDLIFE

SHENANDOAH NATIONAL PARK
1989

Shenandoah National Park
U. S. Department of the Interior
National Park Service
Rt. 4, Box 348
Luray, Virginia 22835

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TABLE OF CONTENTS

	<u>Page</u>
I. Introduction	1
II. Capture Methods	1
III. Immobilization Drug Delivery System: Use and Maintenance.....	5
IV. Animal Care and Handling	6
V. Pharmacology of Immobilization Drugs	9
VI. Animal Reaction	13
VII. Safety	15
VIII. Training and Certification Requirements.....	16
IX. Drug Accountability.....	17
X. Reporting.....	18
XI. Appendices	
A. Capture Record Form, SNP-48	19
B. Drug Dosage Table	20
C. Instructions for Use of Cap-Chur™ Equipment	21

I. INTRODUCTION

Capture, drug immobilization, and relocation of wildlife in Shenandoah National Park is complex technical activity which requires specific training and experience to carry out safely and successfully. The purpose of this guide is to document approved procedures, establish training, and certification requirements and to provide a reference manual for field staff members. To supplement these guidelines, annual training sessions detailing the practical aspects of the capture process are held. In order to ensure the safety of employees and the public, and humane care of animals, only properly trained employees will be allowed to handle wild species.

It must be emphasized that both wild and feral animals must be treated with caution at all times during the capture, immobilization, and transportation process. Special care should be taken to ensure that animals are handled as humanely as possible. Immobilization of free-ranging wildlife in visitor-crowded areas will be attempted only in extraordinary situations when there is an immediate and imminent threat to visitor safety. Animals trapped in such areas will be removed to non-visitor locations for processing.

II. CAPTURE METHODS

There are three primary capture methods approved in this guideline: free-range immobilization, culvert and box trapping, and the use of Aldrich foot snares. Certified field personnel will be responsible for determining the most efficient capture method depending on the species of animal, the circumstances, and field conditions. A safe and successful capture is the primary objective.

FREE-RANGE CAPTURE is a versatile method and can be used in most locations within the Park. The method is most certainly limited to individual animals that can be easily approached to within the limited range of the capture equipment. Black bear, deer, and dogs are the animals most frequently captured with this method. Careful planning is the key to success. Many animals will run or behave unpredictively after dart impact. Therefore, it is important to carefully chose the capture location. If this is not possible, then altering the time of day to avoid visitors or traffic may be needed. Timing is critical in free-range captures. Following dart impact there should be a period of at least 15 minutes when the animal will not be disturbed in any way

so that the cumulative effects of the drug can take effect. The animal should be kept in sight if possible, but not chased. The key is to know where the animal is but to allow it to relax and go down as naturally as possible. Care should be taken to assure that the animal is fully immobilized before it is handled.

In campground, picnic, or other developed areas, personnel should choose a darting site, ideally, adjacent to an uphill slope and away from water. By positioning the animal between yourself and the slope it will have a greater chance of going uphill after dart impact. The importance of this will become obvious after you try to drag a 400-pound bear up hill. The gradient will also result in an increase in circulation in the animal. More of the drugs will be introduced into the circulatory system, resulting in more rapid immobilization.

Water is to be avoided since the animal may become immobilized at an inopportune moment and drown. Heavily vegetated areas, especially low growth vegetation where concealment is to the animals advantage should be avoided. Free-range capture of animals will not be attempted in developed areas during periods of high visitation, unless the areas can be adequately sealed off to prevent visitor access. In most cases it is best to carry out these captures either at night or very early in the morning before visitors are up and about. The Bear Management Plan gives specific policy on capture of this species.

A minimum of two people are needed to attempt a field capture. The assistant stands behind the gunner and watches the trajectory of the dart and marks the time of injection on the field data sheet. Both people can keep track of the animal until it goes down. If the dart misses, every attempt must be made to find the dart.

Tips for successful capture:

1. All types of darts must be filled to full capacity. Add distilled water to the drug if necessary. This will prevent air from being injected into the bloodstream.
2. Animals should be darted in the large muscle areas of the body such as the hind quarter or front shoulder. Neck injection has excellent results but this area presents a small target. Care needs to be taken to avoid hitting bone, as this will cause the dart needle to bend or the dart to bounce out before all of the

drug is injected. Injection into the lungs or abdominal cavity of the animal may cause death.

3. Make sure you are close enough for accurate placement of the dart. Do not try to shoot through brush. The smallest twig will deflect the dart.

4. The dart length must be suitable for the size of the animal (3/4 or 1-inch needles for deer, 1 1/2-inch for adult bear, 1-inch for cubs, 3/4-inch for raccoons, skunks, dogs, etc.).

5. Use an indirect route when approaching the target animal. Stop frequently and act casual. A direct, sneaky approach usually causes the animal to become alarmed, thinking that you are a predator.

6. Load two darts so that you have a quick backup shot. It is easy to miss in the woods.

CULVERT AND BOX TRAPS can be used very effectively on most species of wildlife and feral animals. The use of the culvert trap to capture and relocate black bears has proven to be the most effective and advantageous procedure. The greatest advantage is that the trap can be baited and left unattended overnight. When a persistent bait, like country ham scraps are used, the trap can remain in operation for weeks. During extended trapping periods, the trap should be checked at least twice a day, preferably morning and late evening. Culvert traps should be kept clean and properly maintained. Cables should be replaced when wear causes shredding of wire strands. All access doors should be kept locked unless the animal is being processed. All trap doors should have locks preventing the unauthorized opening of the trap door. An added advantage to a completely secured trap is the prevention of unauthorized removal of the animal.

When using a culvert trap, guidelines found in the Bear Management Plan must be followed. Traps should not be left unattended in areas where tampering by unauthorized persons is likely. Fresh bait should be used which is not rotten. After each capture, all bait and other debris should be cleaned from the trap.

The major disadvantage of the culvert trap is the non-selectivity of an unattended trap. If a particular animal is the subject of a capture effort, several animals may be trapped before the target animal is caught. In spite of careful trap design, some

bears will damage their claws and teeth on the trap attempting to escape. This is one of the primary reasons why traps need to be checked frequently and removed to a quiet location after capture. Frequently, a cub will be caught and the female will remain in the area. This can get exciting when the trap is checked. If the sow is not the target animal, the cub should be let out of the trap immediately. If the family group is the target then another trap can be brought in to catch the female or a free-range capture can be attempted.

Box traps and small wire mesh live traps are frequently used to catch skunks, raccoons, feral cats, and other small animals. Large box traps can be used to catch deer in areas that are readily accessible. These traps should be placed in areas where visitors are not likely to find them and captured animals will not be disturbed. Deer will be tranquilized before being removed from the trap. Only highly skilled persons should ever attempt to handle a deer that is not completely immobilized. It is surprising how powerful a small deer can be when frightened. Serious injury can be inflicted on the untrained or unprepared handler.

ALDRICH FOOT SNARES are limited almost exclusively to removal of nuisance bears in the backcountry. This type of snare is very effective in catching bears. It is especially effective on animals that have become shy of culvert traps. When properly set, it is not easily detected by visitors. The equipment is light, portable, and low in cost. There are two major disadvantages to the use of foot snares. The primary one is that a bear caught in a snare usually becomes very upset and presents a danger to anyone who should accidentally happen to approach the animal. If not closely attended, snares can only be used in remote areas. In developed areas or heavily used backcountry areas they can be used only when the circumstances can be carefully controlled and personnel are highly skilled and experienced. Snares can also cause damage to the bears foot. Some bears fight the snare harder than others and if left in the snare for more than a few hours can end up with cable cuts. In most cases, however, foot damage is slight and can be easily treated with no lasting adverse effect on the animal.

III. IMMOBILIZATION DRUG DELIVERY SYSTEM: USE AND MAINTENANCE

Each district has been supplied with a field drug immobilization kit. Inventory and maintenance will be the responsibility of district personnel. The kit must be kept in a secured area, such as a weapons locker, when not being used. In the field, the kit must be locked when not in use and secured in a locked Park vehicle. These security criteria are necessary to satisfy current Drug Enforcement Agency (DEA) drug storage requirements and NPS weapons policy.

Materials used to clean firearms are ideal for maintaining immobilization darts, rifles, and pistols. Due to the high levels of humidity of the Park environment, regular cleaning of equipment is necessary. Powder solvent should be liberally used when cleaning dart rifles and pistols. Before use, pistols and rifles should be thoroughly inspected for signs of pitting, debris, or bore blockage.

RIFLES AND PISTOLS

CO₂ Projectors: These rifles and pistols are very reliable when maintained properly. A mistake commonly made is the failure to check for adequate CO₂ pressure. Dry firing assures adequate pressure is present and indicates mechanical suitability of the rifle or pistol. The most common malfunction experienced is CO₂ leakage caused by faulty seals (O rings). This can be prevented by always storing these weapons with the CO₂ chamber charged. This maintains a constant pressure on the seal and prevents it from drying out and warping. Seals can be easily replaced in the field by gently prying the old seal out of its seat and stretching a new one over the end cap.

Powder Charged Projectors: These rifles are a little more complicated than those powered by CO₂ and therefore there is more that can go wrong with them. The charges are very corrosive and require that the rifles be cleaned after every use. If a rifle barrel is allowed to get rusty and pitted, the dart tails will not run smoothly. The result is excessive drag and low velocity. After heavy use the gas chamber rods on the Pneu-Dart rifles must be scrubbed clean. Excessive accumulation of corrosion on these rods will result in a reduction of velocity and will eventually ruin the rifle.

DARTS AND ACCESSORIES

Palmer aluminum barrel darts should be clean, with no debris remaining from previous use. All parts of the dart including the rubber plunger and tail section should be cleaned in a warm soap solution. A toothbrush is excellent for scrubbing the rubber plungers and exterior portions of the dart. Wire brushes and cloth patches for .38 caliber firearms can be used to clean the inner bore of the dart body. Dart needles should be soaked and scrubbed in a soap solution until all blood and debris is removed. An 18-gauge needle attached to a 10cc. syringe filled with soap solution can be forced through the bore of the dart needle to remove tissue or dried blood. A paper clip can be used to force any substantial debris from the needle bore.

Infectious diseases can be transmitted from animal to animal by the use of contaminated needles. Soaking the dart needles between usage in an antiseptic solution after cleaning in soap solution is advised. Perhaps the standard which should be followed is that if the dart is clean enough for human use, it is satisfactory for animal use.

Disposable darts need no special care. Even though they are labeled as disposable, every effort should be made to find the darts after they have been fired so that they can be properly disposed of.

The small brass Palmer charges must be stored in a sealed container with silica gel or CUSO_4 packets. These dessicants will absorb moisture from the container, keeping the powder in the charge dry. The charges are very similar to primers. They should be stored in suitable containers to prevent accidental discharge.

One extra of all spare repair parts should be kept in the field kits so that emergency repairs can be made to the rifles or pistols. However, since these repairs are usually easier to accomplish in the shop, all equipment should be thoroughly tested prior to going into the field.

IV. ANIMAL CARE AND HANDLING

Immediately after capture, the immobilized animal should be observed for any injury or atypical behavior. Loud noises, sudden movements, and rough handling should be avoided. If the

animal is culvert trapped, the trap should be secured and moved to a safe location before the drug is administered.

Black Bear: Following immobilization the bear should be positioned on its sternum with head and neck extended slightly downhill. This will allow for adequate respiration and drainage of fluids. The eyes should be moistened with eye drops and then closed.

The animal should then be checked for overall condition and the presence of tags or tattoos. If it is to be tagged this should be done promptly. Unless the bear is being caught for research purposes, a tag provided by the Virginia Department of Game and Inland Fisheries (VDGIF) will be placed in each ear. They should be located on the top, leading edge of the ear about midway between the base and the tip. When the bear is standing the tags should point upward rather than hanging down. Consecutive numbers are used. Be sure to record the tag numbers immediately.

The dart wound and other injuries found should be treated with a anti-bacterial salve or spray.

Transporting a bear is often a difficult task. The best way to move a bear over the ground is to tie two ropes around both front feet and have two to four people drag the bear. A small bear can be loaded on backcountry evacuation litter. Care should be taken to make sure the bear does not come around while strapped in the litter as the resulting ruckus will leave a badly damaged litter and no bear.

Once the bear is to the roadside the best way to transport it is in a wheeled culvert trap. The bear can be winched into the trap using the ramp provided for this purpose.

White-Tailed Deer: Following immobilization, deer should be placed on their sternum with the front legs folded under the animal in a natural position. If this is not possible the next best position is flat on it's side with the head and neck slightly uphill. Under no circumstances should a deer be allowed to remain on it's back as this will cause gastric juices to be aspirated into the lungs, and also results in breathing difficulty.

It is not wise to tranquilize pregnant does that are within 10 days of term. Since it is not possible to accurately determine a particular does state of pregnancy, it is advisable

to curtail capture operations for female deer between May 15 and July 1.

Extra care should be taken when handling adult male deer during the fall rut. These animals can be unpredictable and it usually takes a larger dose to put them down.

Lubricating eye drops should be placed in the eyes and they should then be closed and covered with a cloth or head band made from a sock.

The dart should be treated to prevent infection.

Deer are tagged with NPS aluminum tags in the same location on the ears as described for black bears. It is usually satisfactory to only tag one ear.

Deer can be dragged for short distances but the best way to move them is to pick them up and carry them (not hanging upside down) or place them on a litter.

Deer are best transported in the back of a pickup. All four feet should be securely tied with wide, flat webbing. A deer can recover from the drug very quickly, therefore, it is necessary to watch the animal very closely while it is being transported. If an animal shows signs of recovery, it should be given an additional intravenous injection of 1/2 cc of drug. The animal should be allowed to recover in a quiet place. Do not relocate a deer to within 300 feet of any road or developed area. If time permits, the deer should be watched until you are sure that the animal has recovered successfully.

Small Animals: Immobilized small animals can be placed in a cage and allowed to recover naturally. They can be transported in a pickup and easily relocated. Skunks that are in a small live trap are usually not able to spray. However, if the trap is large enough for the skunk to lift its tail high enough to activate the scent gland, look out! The best trap for a skunk is one that it can just barely fit in to. These critters can be kept calm by drapping a cloth over the trap so that they cannot see what is going on. The same general care should be provided for small animals as that given to bear and deer.

Snakes: Poisonous snakes may need to occasionally be removed from developed areas. The best way to handle them is to pick

them up near the middle of the body with a snake stick. tongs, or a tool such as a hoe or rake. If the snake is not too excited it will usually lay on the tool long enough for it to be dropped into a empty metal trash can. Fasten the lid securely and transport the snake to a remote location for release. There is not any reason to re-locate any species of non-poisonous snake.

V. PHARMACOLOGY OF IMMOBILIZATION DRUGS

There are two immobilizing drugs which are widely used within the Department of the Interior for wildlife immobilization. They are: M-99 and ketamin hydrochloride (Ketaset). M-99 is a morphine derivative and can only be used under the direction of a veterinarian. Ketaset is the drug used in Shenandoah National Park. It is mixed with Rompun, a general sedative, to obtain the desired immobilizing effects.

KETAMINE HYDROCHLORIDE

Basic Information

Ketamine hydrochloride is a structural analog of phencyclidine hydrochloride (Sernylan) and is manufactured under the brand names Ketaset (Bristol Laboratories, Syracuse, NY) and Vetalar (Parke-Davis Laboratories, Detroit, MI).

KHC is available only in a solution concentrated to 100 mg/cc. The low concentration of the base solution represents the major disadvantage in the use of this drug. Remote injections of dosages over 10 cc in volume are not recommended as they result in direct damage to the animal upon impact and subsequent intramuscular damage during injection. The manufacturer claims that KHC recrystallizes out of solution at concentrations greater than 100 mg/cc.

There are not any restrictions in obtaining KHC for wildlife use. Although chemically very similar to phencyclidine hydrochloride, it has not been subjected to significant amounts of street abuse. KHC has been used to immobilize wild animals for over 15 years and is rated as highly reliable. Animal deaths following use of this drug are rare and are usually a result of poor animal health or other contributing factors.

Classification and Action

Ketamine hydrochloride is another of the centrally acting drugs that produce a state of disassociative anesthesia through depression of the nervous system, resulting in the loss of consciousness. A profound state of analgesia (loss of pain) is reported, but normal pharyngeal and laryngeal reflexes (swallowing and coughing) are maintained. Very mild cardiac stimulation and occasional respiratory depression is encountered. At lower dosages, skeletal muscle tone may be slightly enhanced, while at higher dosages there is a loss of muscle tone and a resultant decrease in body temperature. Ketamine also lacks the convulsive properties of Sernylan (phencyclidine). Salivation may increase during immobilization. Its action is rapid and non-addictive.

Immobilization rarely lasts between 30 and 60 minutes unless an unusually high dose is given.

MIXTURES OF KETAMINE AND XYLAZINE

Basic Information

One of the more recent developments in the field of immobilization has been the use of drug combinations. One excellent combination is the addition of xylazine hydrochloride or Rompun to Ketamine. Rompun is made available in solutions concentrated to 100 mg/cc and remains stable for long periods of time. Although relatively new in North America, xylazine has been successfully applied to a wide range of African carnivores and ungulates for several years. It represents no direct danger to the field worker.

Classification and Action

Xylazine (Rompun) is classified as a central nervous system depressant, and when used alone, its action may be described as a sedative, analgesic, and muscle relaxant. The drug, a non-narcotic, produces varying planes of unconsciousness according to dosage level. There is an almost complete exclusion of anxiety and excitement (tranquilizing effect) which are known to increase the danger to the animal.

When used together, xylazine and ketamine exhibit a very marked

synergistic effect, that is, their combined effect is far greater than the sum of their individual effects. This represents a major benefit as it reduces the prohibitively large volumes of ketamine required for use on large animals. In addition, xylazine provides the advantages of a tranquilizer as well as enhancing the pain-killing and muscle-relaxing qualities of ketamine.

Accidental Injection and Medical Treatment

The manufacturer does not indicate any direct danger to persons working with this drug combination. The accidental injection of the KHC into a person at the dose level normally used for large mammals is not life threatening. However, effects similar to other mammals will occur and complications could result if a particular individual should have other medical problems. Tissue damage, bruising, and infection are other concerns of accidentally hitting a person with a dart. The analgesic symptoms of KHC in humans can be partially counteracted with an injection of a CNS stimulator such as adrenaline. In the event of accidental injection, a Park medic should be called and specific medical advice that is tailored specifically to the individual involved should be obtained from the medical services physician on call.

Application, Dosage, and Results

No long-term or immediate side effects have been reported with this drug mixture. Considering the beneficial attributes of the individual components and the decreased dosage required due to the synergistic effect, few complications are to be expected (see Appendix).

Mammalian Species/Documented Application

The literature indicates that Ketamine has been widely and successfully used on many families of carnivores, such as the bears, large cats, canids, and mustelids.

Ketamine is well suited for use in game animals (ungulates) as it is not accumulated in fatty tissues. Parke-Davis (1974) report that 88-89 percent of the drug is detoxified in the liver and excreted by the kidney. This is important because of the chance that animals immobilized in the Park could leave the area and be harvested during the legal hunting season. Because of the above mentioned properties KHC does not pose any threat to persons eating the meat of a previously immobilized animal.

Dosage and Latitude of Tolerance

Animals have been found to exhibit a very wide range of tolerance for KHC/Rompon mixtures, thereby greatly reducing the chances of overdose. In black bears, 1cc/50 lbs of body weight of drug mixture is optimum, but dosages of up to twice that amount can be given with no ill effects. The wide latitude of tolerance reduces the need for highly accurate estimations of weight in the field.

The period of anesthesia may be lengthened by giving additional intramuscular injections via syringe. Additional doses of 1/2 of the original dose, but not to exceed 1 cc at a time, will prolong the down time approximately 20-30 minutes per injection. This is only a rough estimate. Care should be taken to closely monitor the animals response to continued anesthesia.

Induction Time and Symptoms

Induction time is the period elapsing from time of injection until the animal may be safely approached. Injection into subcutaneous fat greatly increases induction time, whereas accidental intravenous injection brings immediate induction accompanied by decreased respiration. In black bears, the initial symptoms of the drugs effect are panting, salivation, and flicking of the tongue followed by the onset of general lack of coordination. Immobilization takes place gradually, first affecting the hind-quarters, then the front-quarters, and finally the head and neck. Deer show different symptoms. They lower the head and start to stagger. This may go on for 2-3 minutes before finally going down.

The desired level of immobilization is reached when the animal does not respond to visual or audio stimulation and the eyeballs become slightly bulged and nystagmic (involuntary movement of the eyeball).

Drug Preparation

The ratio and preparation of the drug combination are very important factors, especially when fast down-times are required during free-range captures. The combination must also provide complete immobilization for at least one hour. A ratio of 100 mg of Rompun to 200 mg of Ketaset is used. The purpose of the preparation is to provide the most efficient ratio in an acceptable

amount for rapid systemic introduction via intra-muscular injection.

Preparation of the combination involves freeze-drying (lyophilizing) liquid Ketaset to achieve the powdered or crystalline pure form. Ketaset (Bristol Veterinary Products) comes in a 10 ml vial concentrated 100 mg/cc, which translates to 1000 mg Ketaset/vial. We take 3000 mg Ketaset (three 10 cc vials) in the liquid form, put the 3000 mg in a 50 cc serum vial, and freeze-dry the liquid. After freeze-drying, we still have 3000 mg of powdered Ketaset. Rompun (Haver-Lockhart) comes in a 50 ml vial concentrated 100 mg/ml. By adding 15 cc of liquid Rompun to 3000 mg of crystalline Ketaset, a 100 mg Rompun:200 mg Ketaset concentration per cc is obtained. The freeze-dried Ketaset easily enters into the Rompun solution, becoming a clear liquid ready for injection. This combination is also very stable, with a shelf life equivalent to that of the date listed on the drug vials.

The freeze-drying process takes about 24 hours on a lyophilizing machine. We use empty 50 mg vials as containers for the freeze-dryer. The actual process is carried out for the Park by the U. S. Fish and Wildlife Service Cooperative Unit at VPI&SU.

On checking the drug dosage table in the Appendix, you will note that a 300-pound black bear will require a 6.0 cc injection. If a liquid Ketaset/liquid Rompun mixture were used for bears of much greater weights, this would necessitate a dart syringe about three feet long launched by an ICBM!

VI. ANIMAL REACTION, DOWN TIME AND SIDE EFFECTS

The visible effects that the drug has on a specific species varies from species to species and by individual within the species. It is doubtful that we understand all of the factors that contribute to this variation. A few that have been documented are: factors consistent within the species, individual animal health, reproductive status, age, injuries, activity at time of injection, and weather conditions.

Pound-for-pound, black bear are the easiest to immobilize. They go down quickly, stay immobilized for a good length of time (1-2 hours), and suffer very few, if any, side effects. The major difficulty in achieving good results is dart placement. Adult bears usually have a considerable amount of subcutaneous fat. The dart needle must be able to penetrate through the fat into

muscle tissue. Rump shots are rarely effective on fat bears. The best results are achieved by placing the dart into the front shoulder or low on the hind leg, between the knee and the top of the rump. Neck shots are not advisable on bears because of the very thick hide and hair in this area. The drug will usually start to take effect within 5-8 minutes. The first signs are a slow, staggering gait, and increased tongue movement. The animal will then sit down, role its head from side to side, and lick the air. It is important not to disturb the bear at this time so that the animal can relax and become completely immobilized. It is advisable to poke the bear with a stick to check the state of immobilization before grabbing a body part. Most animals will stay down for 30-60 minutes. However, you never know for sure how long a particular animal will stay out and they can come around quickly. From the time that the bear starts to move its eyes and ears you may have only 1-2 minutes before it can stand.

Deer are often more difficult to immobilize than bear. They seem to be better able to resist the effects of the drugs. It takes twice the dose to immobilize a deer as a bear. Deer that become frightened following dart impact can often travel long distances. Apparently because of the counteraction of adrenaline, some of these animals never go down. This is the primary reason why a darted deer should never be chased. A deer may become partially immobilized. It is not uncommon to have a deer react by weaving, stumbling, going down, and getting up but never going all the way out. In these situations it may be possible to wrestle the animal down and give it an additional dose by hand. In the case of a large deer, especially an adult male, this may prove to be easier said than done. A second dart administered via a capture pistol would be a better choice. Once a deer reaches a state of total anesthesia it will usually stay under the effects of the drug for 1/2 to 1 hour.

Small mammals such as raccoons and skunks are easily immobilized. A standard dose of 1/2 cc will put most of these individuals out for at least 45 minutes.

Dogs are difficult to immobilize. To start off with, wild dogs are hard to approach. Tame, pet dogs should not be immobilized unless there is an unusual problem. After being hit by a dart, wild dogs usually run like they just stepped on a hornets nest. Successful free-roam capture of wild dogs is difficult at best, but it has been done. If not chased, many dogs will slow down when they get out of sight. Drug reaction time is usually

rapid, within 2-4 minutes, and most dogs stay out for 30 minutes if the proper dose was given.

VII. SAFETY

Safety must be of primary concern when planning and carrying out wildlife capture operations. There are many potential hazards that must be recognized and avoided. Risks can be divided into three categories: (1) risks to capture personnel, (2) risks to unsuspecting visitors, and (3) risks to the wildlife being handled.

The best way to prevent accidents or injury is by assuring that our staff is thoroughly trained and adequately experienced to accomplish the task at hand. Most hazards can be avoided if the operation is carefully planned by trained and experienced staff. The following list should serve as a reminder of particular areas of concern that have been recognized.

1. Treat capture weapons like you would any other firearm, they can kill people as well as animals.
2. Never carry a loaded and charged capture weapon in a vehicle.
3. Don't charge or cock the weapon until you are ready to approach the animal.
4. Make sure you know where every member of your team is at all times.
5. Secure the capture area, keep visitors away.
6. Keep your equipment in good repair so that everything works properly. Makeshift repairs in the field can be dangerous.
7. Understand animal behavior and physiology so that you can predict what various species will do under a variety of conditions.
8. Make sure you have enough people to accomplish all of the planned tasks.
9. Practice frequently enough to maintain skills.

10. Make sure animals are immobilized or otherwise secure before handling or transporting them.
11. Place traps only in secure or remote areas, and be able to check them and remove animals promptly.
12. Plan capture operations. Plan-Plan-Plan.

VIII. TRAINING AND CERTIFICATION REQUIREMENTS

Wildlife capture and immobilization is a specialized field and requires specific knowledge and skills. Both activities have, in the past, been publicly controversial. In addition, these operations include potentially hazardous situations. Because of the sensitivity of these operations, it is Servicewide policy that Parks develop directives that require specific training requirements for persons authorized to use immobilization drugs for the capture or handling of wildlife.

Wildlife capture training requirements for Shenandoah National Park consist of 8 hours of classroom instruction, 4 hours of individual firing range practice, and 16 hours of hands-on experience assisting a certified person in a capture operation. The formal instruction will contain the following subject matter.

1. NPS policy and history of wildlife capture
2. Operational planning requirements
3. Pharmacology of immobilization drugs
4. Drug storage, use, and accountability
5. Safety
6. Mammalian physiology and behavior patterns
7. Wildlife handling techniques
8. Capture weapon and trapping skills
9. Interpretation of field activities to the public
10. Data collection and reporting

The firing session is not designed to teach a person how to handle a firearm. In order to qualify to take this course, students must have satisfactorily completed a NRA-certified or equivalent firearms course or have a current law enforcement commission. The range session is for the purpose of becoming familiar with the various type of capture weapons, their

capabilities and limitations. Instructions on the loading of

darts, dart selection, and equipment maintenance will also be covered.

The purpose of the field session(s) is to allow the student the opportunity to receive personal instruction from an individual currently certified in wildlife capture, and to apply, in a real setting, the knowledge and techniques discussed in the classroom sessions. This is a most important requirement and must be carried out. Performance is what the training is all about. A person cannot be certified to handle immobilization equipment unless he/she can demonstrate an adequate understanding of the topic and a skill level needed to assure a safe and effective operation. The practical exercises will include the immobilization and handling of a minimum of three deer. If opportunities exist, a bear may be substituted for one of the deer. The field instructor must document, in writing, that the student has met the above requirements and is recommended for certification.

District rangers will recommend persons on their staff who have completed the training and they feel are skilled enough to supervise and carry out a wildlife capture operation. Natural resource office students will be recommended by their supervisor. The training records and documentation for each person recommended will be reviewed and approved by the Chief, Natural Resources Branch (CNRB). Each year, during the month of May, the CNRB will provide the Chief Ranger with a list of employees who are certified to carry out wildlife capture operations using immobilization drugs.

Persons who have attended the classroom training session are automatically authorized to trap and handle wildlife in cases where immobilization drugs are not needed.

IX. DRUG ACCOUNTABILITY

Wildlife capture drugs will be purchased by the Park Natural Resources Specialist and distributed to the field. It is the responsibility of the district ranger to assure that drugs are being used according to the protocols described in this manual. A drug log will be kept. The log should have two sections, amounts received and amounts used. The amounts received section will record the amounts of each drug received from the Natural Resources office by date. The used section should record how much was used in the field by date. These records will be kept for three years.

X. REPORTING

Each wildlife capture operation, other than black bear, will be reported on SNP-48, Wildlife Capture Record. Bear incident and management action forms will still be used for these respective operations because of specialized information needs that must be recorded. Refer to the Bear Management Plan for instructions on these report forms. The Wildlife Capture Record will be used to track wildlife management operations, to document workloads, and to record animal relocated sites. They will be routed through the Chief Ranger's office to the Natural Resource office for filing.

Appendix A

SNP-48

SHENANDOAH NATIONAL PARK

WILDLIFE CAPTURE RECORD

DATE _____ DISTRICT _____ TYPE of capture: Drug Trap Snare Other

SPECIES _____ AGE _____ SEX _____ CONDITION _____ TAG # _____

REASON FOR CAPTURE _____

_____CAPTURE LOCATION _____

_____RELOCATED/RELEASE LOCATION _____

DRUG CAPTURE DATA: Dose _____ cc Dart Type _____

Method _____ Location of Injection _____

Time Injected _____ Time Down _____ Time Recovered _____

Reaction/Behavior _____

_____Additional Doses Given _____

_____Comments _____

CAPTURE PERFORMED BY: _____

REVIEWED BY: _____
Chief Ranger Natural Resource Specialist

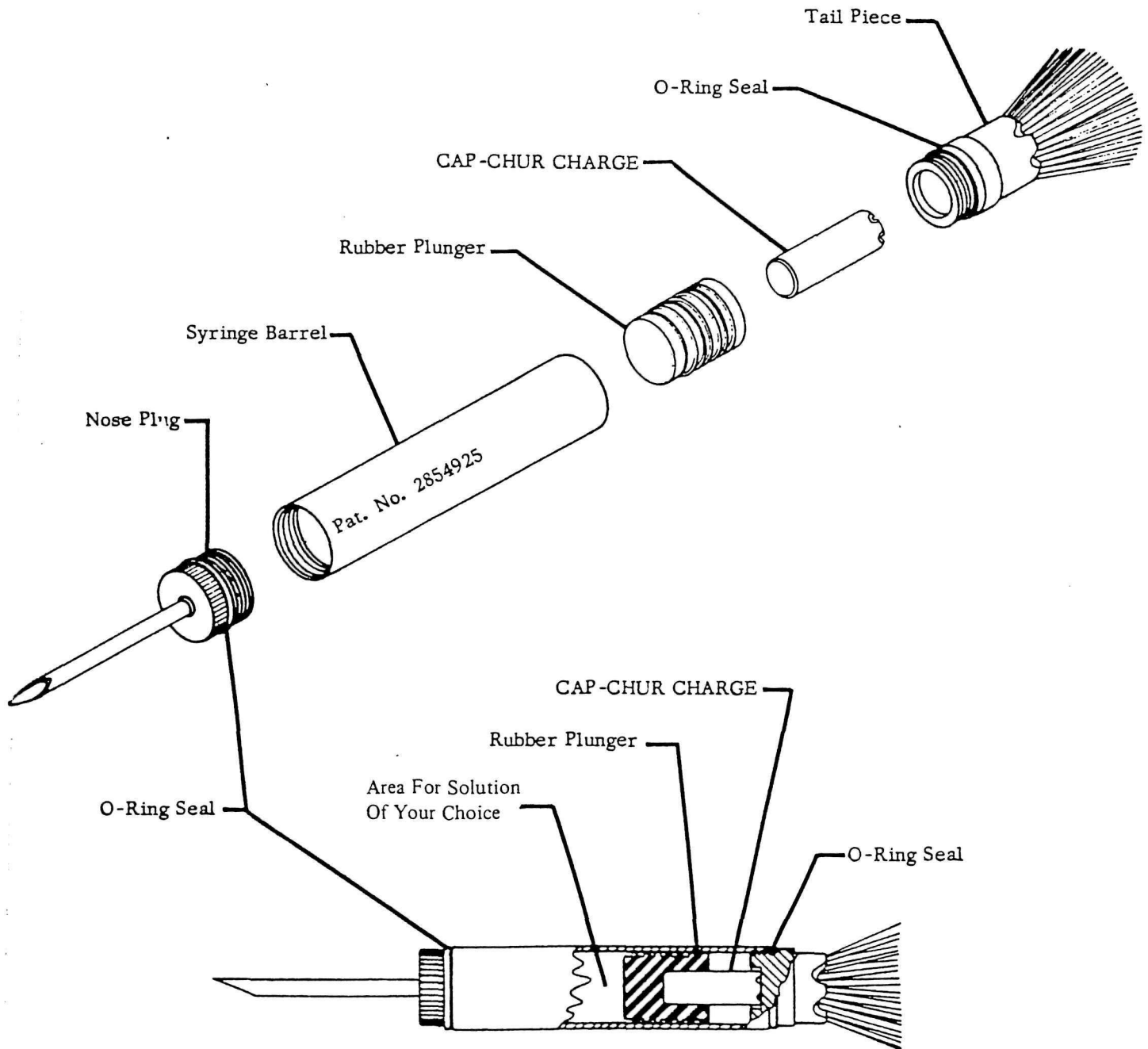
Appendix B

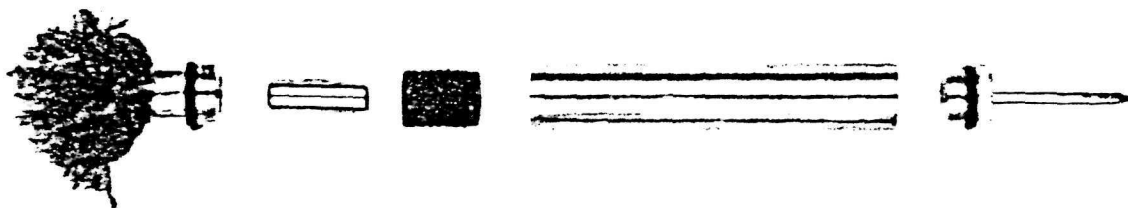
DRUG DOSAGE TABLE

<u>SPECIES</u>	<u>DOSAGE</u>
Black Bear.....	1 cc/50 lbs.
White-Tailed Deer.....	1 cc/75 lbs.
Dogs.....	1 cc/50 lbs.
Domestic Livestock.....	1 cc/100 lbs.
Small Mammals.....	1/2 cc/animal

(1 cc of mix contains 200 mg. of Ketamine HCL and 100 mg. of Xylazine HCL.)

DIAGRAM OF THE CAP-CHUR SYRINGE





INSTRUCTIONS FOR USE OF CAP-CHUR SYRINGES

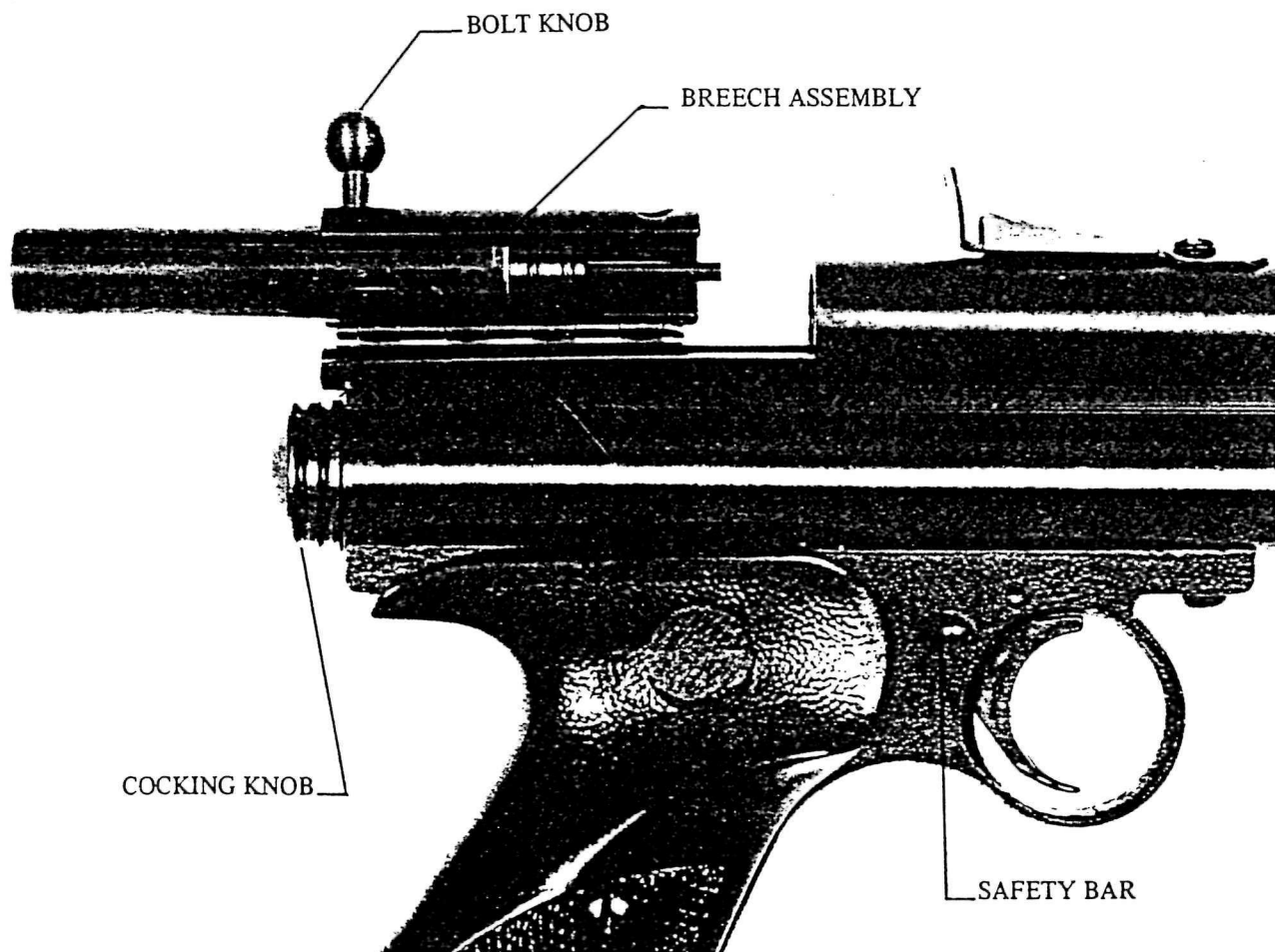
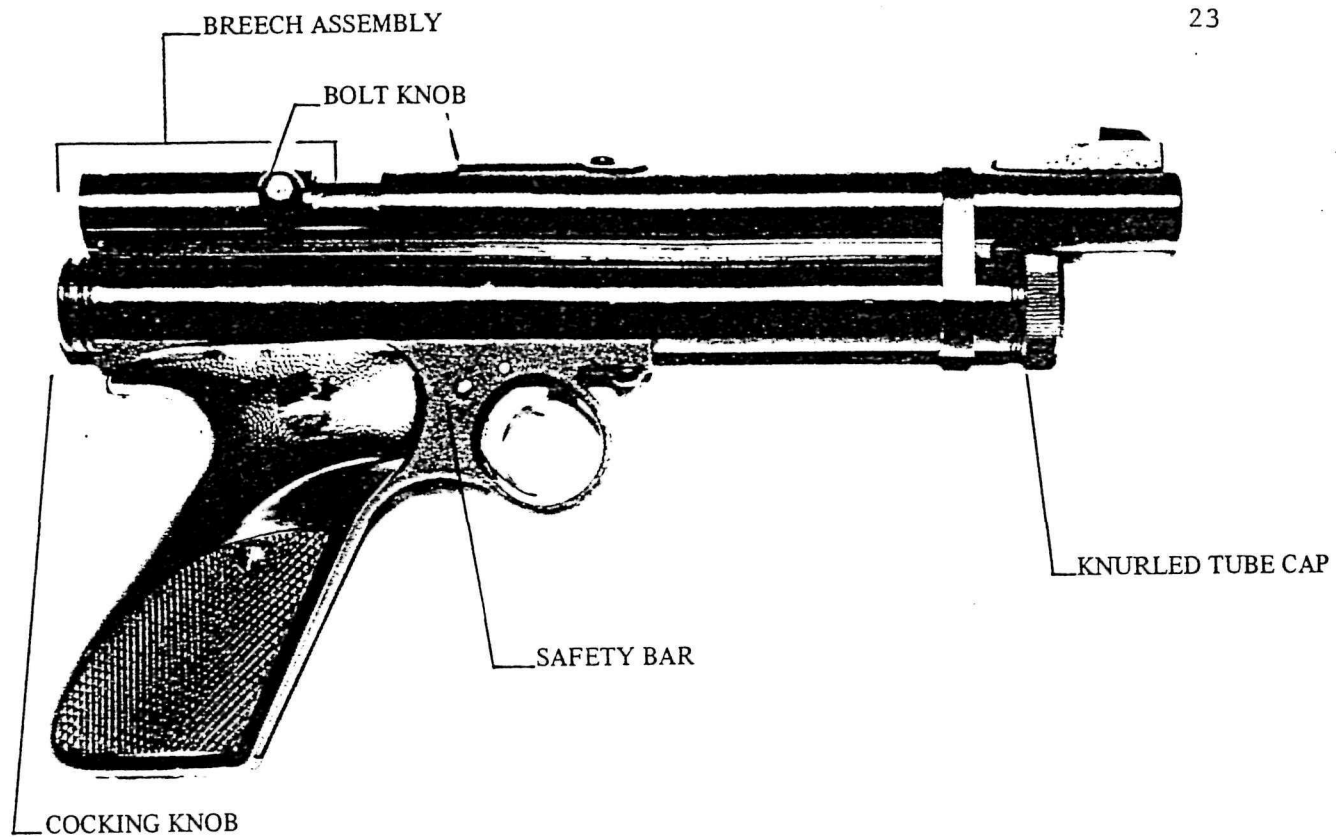
It is important to practice the assembly, loading and discharge of the syringe before attempting to use one in the field. Practice will insure that the instructions have been understood and the equipment is functioning properly. Practice not only makes perfect, it saves wasted time in the field.

INSTRUCTIONS FOR ASSEMBLING THE CAP-CHUR SYRINGE

1. Lubricate the rubber plunger with a light coating of plunger lube.
2. Place the Cap-Chur Charge in the rubber plunger with the solid end in and the swaged end out.
3. Placing the plastic rod labeled positioner against the swaged end of the Cap-Chur Charge push the rubber plunger and Cap-Chur Charge Assembly all the way through and out the other end of the barrel. This lubricates the inside of the syringe barrel, do it twice.
4. Place the plunger and Cap-Chur Charge back in the syringe and screw on the tail piece. The swaged end of the Cap-Chur Charge should be against the tail piece.
5. Load the injection in front of the rubber plunger with a medical hand syringe, If the injection does not fill the syringe barrel, use sterile water to fill it up to the bottom of the threads.
6. Screw on the Nose Plug.
7. The syringe is now ready to be used in the projector.

NOTE: The Cap-Chur Charge must be kept dry.
Secure the nose plug and tail piece firmly by hand to prevent pressure leakage.

After being used, the syringe should be taken apart and cleaned in warm soapy water. If the syringes are not used within two days, the solution should be emptied out of the syringe by removing the nose plug and the barrel should be cleaned with plain water. Reasonable care and thorough cleaning of the syringes will insure long life and freedom from corrosion.



OPERATING INSTRUCTIONS FOR THE SHORT RANGE PROJECTOR

Make sure there is no syringe in the barrel. Close and lock breech bolt. Fire projector repeatedly to exhaust residual gas.

TO CHARGE PROJECTOR:

1. Unscrew and remove knurled tube cap. (IF UNABLE TO TURN BY HAND DO NOT ATTEMPT TO REMOVE WITH PLIERS OR OTHER TOOLS AS THIS DENOTES THAT THE PROJECTOR IS UNDER PRESSURE). Hold muzzle end down and expended gaspak will drop out, then cock the projector before inserting gaspak.
2. Insert CO₂ gaspak in tube, neck down, screw tube cap firmly in place by hand.
3. Cock projector to full power position. (Cocking knob has three ranges of power, the first click is of no practical use except to see if the projector contains CO₂. The second click is for minimum power and the third click is for full or maximum power). Pull trigger to pierce CO₂ gaspak and to release gas into chamber. Fire unloaded projector and recock immediately. Fire projector again. Projector is now ready for loading and shooting.
4. After firing, recock projector immediately to allow valves to close, preventing loss of CO₂ gas.

TO LOAD AND SHOOT:

1. Put safety bar on Safe by pushing to right.
2. Exert slight pressure on the breech assembly with the thumb. Lift bolt knob with forefinger and slide all the way to the rear.
3. Raise breech assembly by lifting bolt knob up and to the left.
4. Insert syringe, needle forward into barrel.
5. Close the breech by lowering breech assembly then pushing bolt knob all the way forward and locking.
6. Cock projector to power of your choice by pulling cocking button until it clicks. The button will automatically return to position.
7. Select target, push safety to left or firing position, red band visible, aim and shoot.

TO UNLOAD SYRINGE FROM BARREL:

Put safety bar on safe by pushing to right. Open breech cover as previously instructed. Insert either a small rod or other round object not more than 7/16" in diameter into the muzzle end of the barrel and push syringe out into loading channel.

CARE OF PROJECTOR:

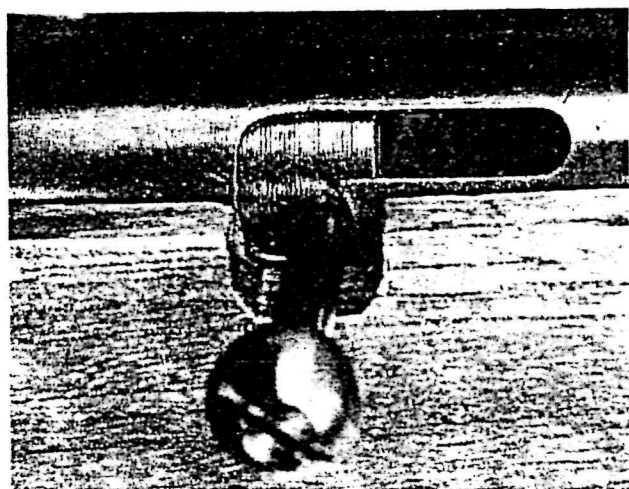
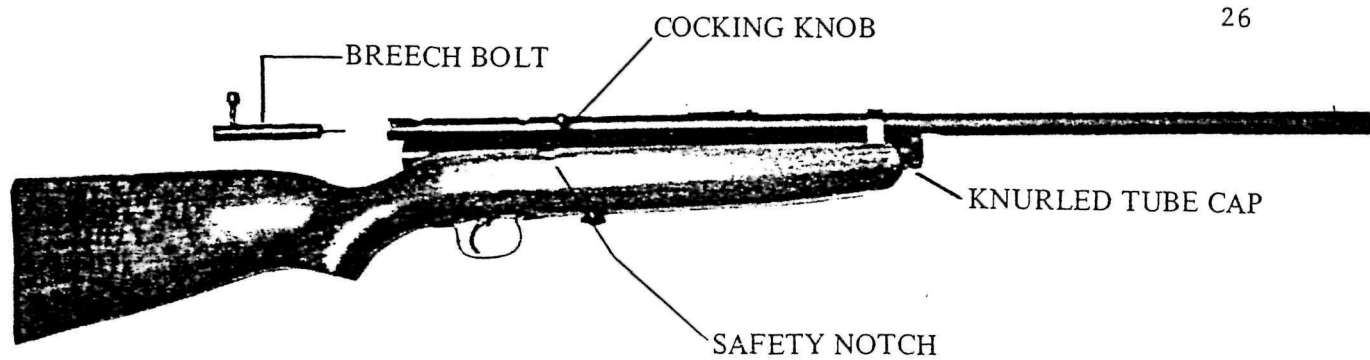
Projector should be kept under pressure (charged with CO₂ gas) at all times. This will greatly extend the operating life of the internal valve seals and help prevent leakage of gas.

Lubricate all moving parts sparingly with gun oil as needed. Wipe off blued steel parts with an oily rag to prevent rust and to preserve the finish. DO NOT USE PENETRATING OR DETERGENT TYPE OIL AS THEY MAY BE HARMFUL TO THE VALVE SEATS.

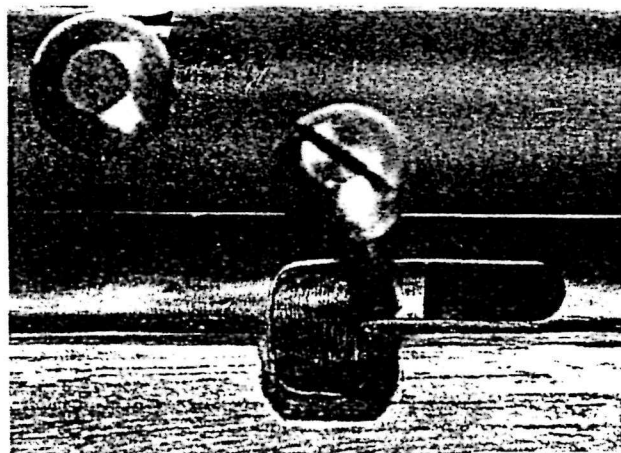
Palmer extra capacity gaspaks are recommended for the best performance in this projector. They are available through Palmer Chemical & Equipment Co., Inc. DO NOT EXPOSE CHARGED PROJECTOR OR GASPAKS TO EXCESSIVE HEAT.

REPAIR SERVICE: Should repair service be required on this projector, return it to Palmer Chemical & Equipment Co., Inc.

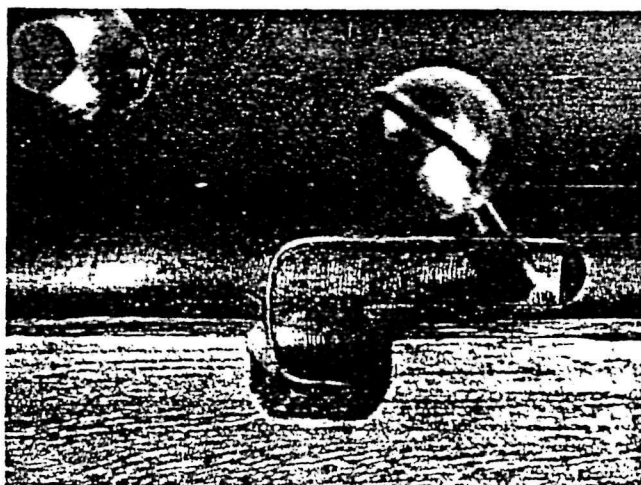
WARRANTY: This projector is guaranteed against defective material, and workmanship for a period of one year from date of sale, providing the projector has not been subjected to abuse or misuse. Repairs which are needed after normal use will be done free of charge if the projector is returned to Palmer Chemical & Equipment Co. or an authorized distributor.



"SAFE"



"FIRE"



"STORAGE NOTCH"

OPERATING INSTRUCTIONS FOR THE LONG RANGE (CO₂) PROJECTOR²⁷

TO EXHAUST CO₂ FROM SYRINGE PROJECTOR

1. Remove breech bolt and make certain there is no syringe in the barrel.
2. Replace and lock breech bolt.
3. Place cocking knob in "FIRE" position.
4. Fire projector repeatedly until all CO₂ pressure is exhausted.

TO CHARGE PROJECTOR WITH CO₂ GAS

1. Unscrew and remove knurled tube cap. (IF UNABLE TO TURN BY HAND DO NOT ATTEMPT TO REMOVE WITH PLIERS OR OTHER TOOLS, AS THIS DENOTES THAT THE PROJECTOR IS UNDER PRESSURE.) Hold projector with muzzle down and used gaspaks will drop out, then cock the projector before inserting gaspak.
2. Insert the first gaspak into the projector neck end down.
3. Insert the second gaspak into the projector neck end up.
4. Screw tube cap firmly into place by hand.
5. Move cocking knob to "FIRE" position.
6. With left hand on trigger and right hand on the cocking knob, cock and fire the projector three times as rapidly as possible. This punctures the gaspaks and releases the CO₂ into the gas chamber. It also insures proper seating of the internal valves and helps prevent leakage.

TO LOAD AND SHOOT THE PROJECTOR

1. Move cocking knob to "safe" position.
2. Remove breech bolt, check to insure barrel is clear.
3. Insert syringe needle forward, into breech.
4. The easiest way to put the syringe into the breech without putting down the bolt is as follows: Hold the projector in your left hand placing your hand slightly forward of the retaining bolt on the bottom of the stock. The projector should be held with the barrel pointed down. Take the loaded syringe in your right hand, and hold it with the last three fingers of that hand. With the thumb and forefinger on the right hand lift up and pull back on the breech bolt knob until it clears the breech then holding the projector in the palm of your left hand and steadying it with the thumb and forefinger of your left hand place the bolt in your last three fingers on your left hand and hold it. Insert the syringe into breech and then take the bolt back into your right hand and push the syringe into the channel. Push the bolt forward until the syringe is in the chamber. (Work bolt backwards and forwards a couple of times to make sure that the tail piece is not jammed by the positioning pin.)

5. Pull cocking knob to the rear and up into firing position.
6. Take aim and shoot.
7. After firing, recock projector immediately to allow valves to close, preventing loss of CO₂ gas.
8. The projector should be carried with the cocking knob in the safety notch at all times to prevent accidental discharge.
9. The projector should be kept under pressure, (charged with CO₂) at all times to prevent deterioration of the valve seals and the resulting gas leakage.

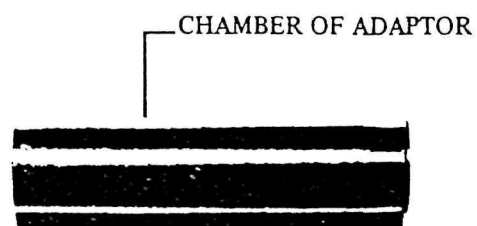
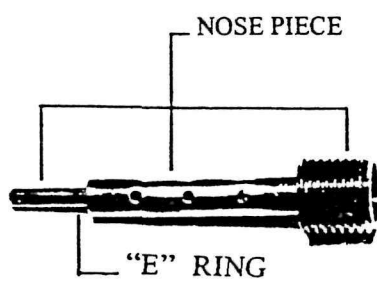
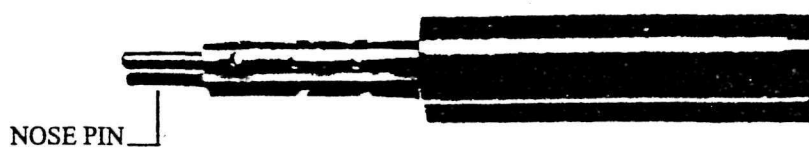
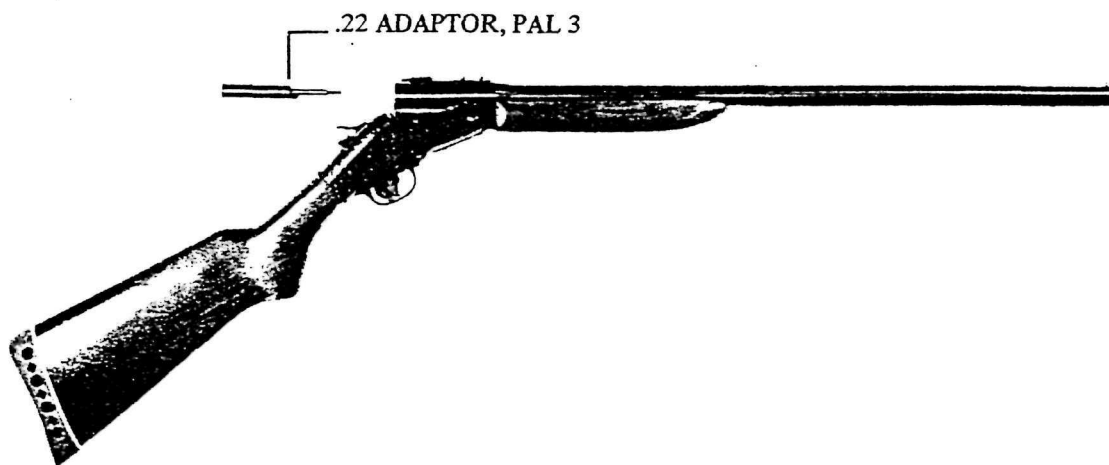
NOTE: This projector shoots in a rainbow trajectory. Compensation must be made for this at maximum ranges.

CARE AND LUBRICATION

1. When not in use the projector should be in some type of dust proof and moisture resistance case or container. This prevents excessive dust or moisture getting into the projector and causing a malfunction of the CO₂ valve system.
2. Lubricate moving parts sparingly with gun oil as needed.
3. Wipe off blued steel parts with an oily rag to prevent rust and to preserve the finish.
4. DO NOT USE PENETRATING OIL OR DETERGENT TYPE OIL AS THEY MAY BE HARMFUL TO THE VALVE SEAT.
PALMER extra capacity Gaspaks are recommended for best performance in this projector. They are available through Palmer Chemical & Equipment Co., Inc. DO NOT EXPOSE CHARGED PROJECTOR OR GASPAKS TO EXCESSIVE HEAT.

REPAIR SERVICE: Should repair service be required on this projector, return it to Palmer Chemical & Equipment Co., Inc. Douglasville, Georgia.

WARRANTY: This projector is guaranteed against defective material, and workmanship for a period of one year from date of sale, providing the projector has not been subjected to abuse or misuse.



OPERATING INSTRUCTIONS FOR THE EXTRA LONG RANGE (POWDER) PROJECTOR EQUIPPED WITH THE .22 ADAPTOR, MARK 3

1. Breech the projector by pushing down on the breech lock release which is situated immediately to the right of the hammer. When the projector is breeched the .22 adaptor Pal 3 will be ejected. Care should be taken to catch the adaptor so that it will not be lost in high grass, underbrush or in snow.
2. Make sure there is no syringe in the barrel.
3. Place the syringe to be used, needle forward, into the barrel.
4. Push the syringe forward with the adaptor. It is suggested that the adaptor be moved in and out two or three times to make certain that the tail piece is not jammed against one side of the barrel.
5. The syringe and adaptor are now in the barrel.
6. Now choose the correct power load for the distance and size syringe. Remember the brown loads should be used for short ranges. the green loads should be used for medium ranges and the yellow loads should be used for long ranges. The Red loads should be used for extreme ranges on large animals only.
7. Place the power load in the bored chamber at the rear of the adaptor.
8. Close the breech.
9. The projector is now ready to be fired.
10. To fire projector cock the hammer, aim and pull the trigger.
11. After the projector is fired, it should be breeched and the expended .22 blank should be removed from the adaptor. (Since occasionally the blank will be expanded more than normal by the explosive charge it is recommended that a pen knife, a small screwdriver or some pointed object be kept handy to remove the blank from the adaptor if it jams).
12. Replace the adaptor in the projector and close the breech.

TO UNLOAD THE SYRINGE FROM THE BARREL:

1. Breech the projector.
2. Remove the adaptor.
3. Insert either a rod or some other round object no more than 7/16" in diameter into the muzzle end of the barrel and push syringe out and into the loading channel.

CARE OF THE PROJECTOR:

1. Lubricate all moving parts sparingly with gun oil as needed. Wipe off blued steel parts with oily rag to prevent rust and to preserve the finish. Using a cleaning rod and patches with a good gun or cleaning oil, clean and oil the inside of the barrel. This should be done frequently when the projector is in use to prevent a buildup of unburned powder inside the barrel.

CARE OF THE .22 ADAPTOR, PAL 3

For best performance the adaptor should be kept clean. In order to allow even gas distribution all twelve holes in the nose piece of the adaptor should be kept free of wad deposit. The nose piece of the adaptor unscrews from the casing. Remove E-Ring from nose pin, drive pin backwards to remove wads. Reset pin and replace E-Ring. Clean as often as needed.

IMPORTANT:

Any size syringe may be used with the green power loads. When using the yellow and particularly the red power loads however, the most ballistically perfect syringes are the 5cc, 7cc, 10cc and 15cc syringes. Because of the velocity of the smaller syringes when they are leaving the barrel, they sometimes have the tendency to spiral excessively or to tumble. This is caused by the fact that these syringes are moving so rapidly they ride across the rifling.

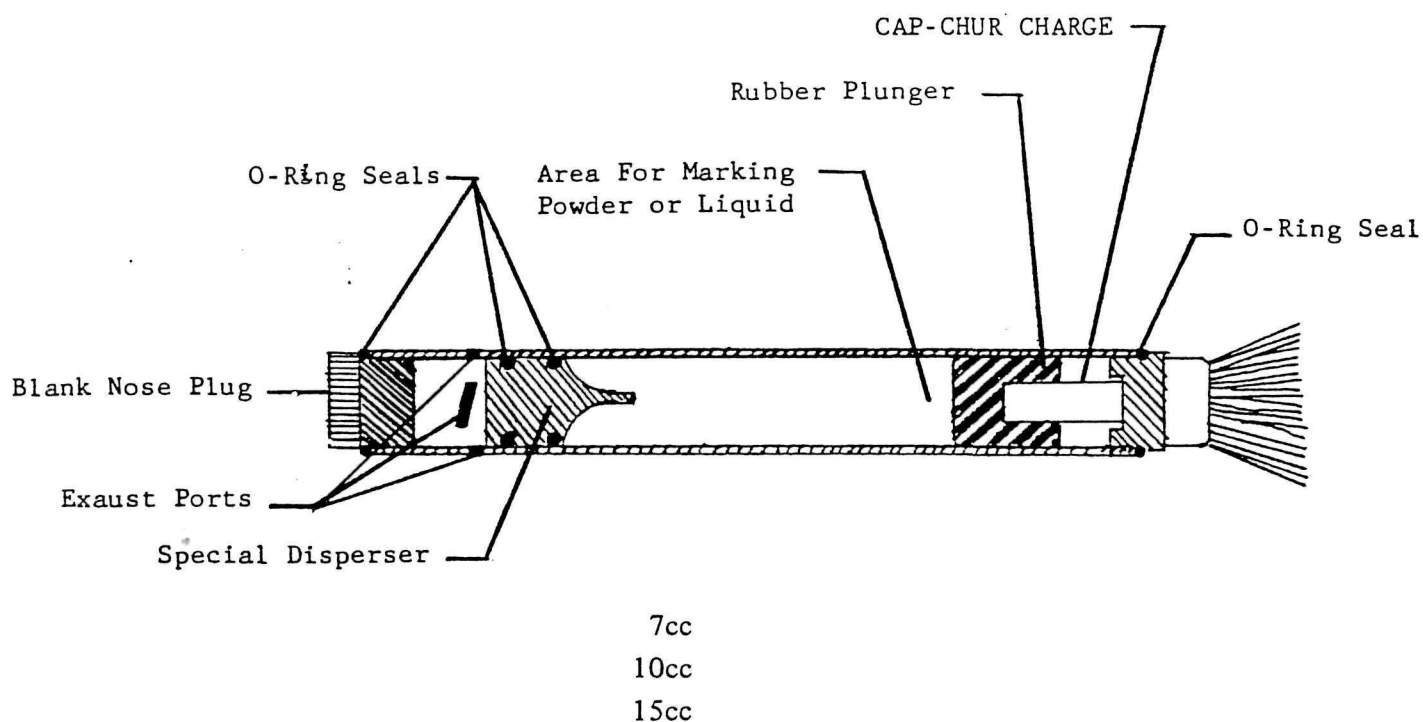
AVAILABILITY OF POWER LOADS:

The correct power loads for use in this projector are available from Palmer Chemical & Equipment Co., Inc. in Douglasville, Georgia or an authorized distributor of Palmer Chemical & Equipment Co., Inc.

REPAIR SERVICE: Should repair service be required on this projector return it to Palmer Chemical & Equipment Co., Inc. in Douglasville, Georgia or an authorized distributor of Palmer Chemical & Equipment Co., Inc.

WARRANTY: This projector is guaranteed against defective material and workmanship for a period of one year from date of sale, providing the projector has not been subjected to abuse or misuse.

THE MARKING SYRINGE



INSTRUCTIONS FOR ASSEMBLING THE MARKING SYRINGE

1. Lubricate rubber plunger with silicone lubricant and pass it back and forth thru the syringe barrel to thoroughly lubricate the inside.
2. Insert a Cap-Chur Charge in the rubber plunger, keeping the open end of the Cap-Chur charge out and insert this assembly into the barrel pushing it up flush with the end of the syringe barrel.
3. Screw on a tail piece.
4. Insert a disperser plug body in the open end of syringe barrel, pushing it just past the exhaust ports.
5. Fill the cavity with powder or liquid to be used.
6. Screw the disperser plug into the disperser plug body and tighten.
7. Screw on nose plug, syringe is ready to use.

DRUG RATES:		
Deer		
	Telazol comes in 5 ml (100mg/ml) vials in powder form.	
	Mix w/ 2.5 cc xylazine (Rompun) & gently shake until clear (may require mild heat such as vehicle defroster)	
	Dose rate:	
	0.25cc - 0.50cc	20 to 40 lb. deer
	0.50cc	40 to 75 lb. deer
	1.0cc	75 to 105 lb. deer
	1.25cc	105 to 125 lb. deer
	1.5cc	125 to 150 lb. deer
	1.75cc	150 to 175 lb. deer
	2.0cc	175 to 200 lb. deer
	2.25cc	200 to 225 lb. deer
	Note: Yohimbine can be used to reverse the xylazine 30 minutes after administering the drug.	
Bear		
	Ketamine hydrochloride (Ketaset) is freeze dried to concentrate the active ingredients.	
	Vials of 1000 mg are most often supplied and are to be reconstituted by adding 5cc of xylazine (Rompun) to the powder and mix until clear (mild heat may need to be applied to dissolve ketamine)	
	Dose rate: 1cc/100 lbs of body weight	
	Xylazine can be reversed with yohimbine 30 minutes after darting.	

