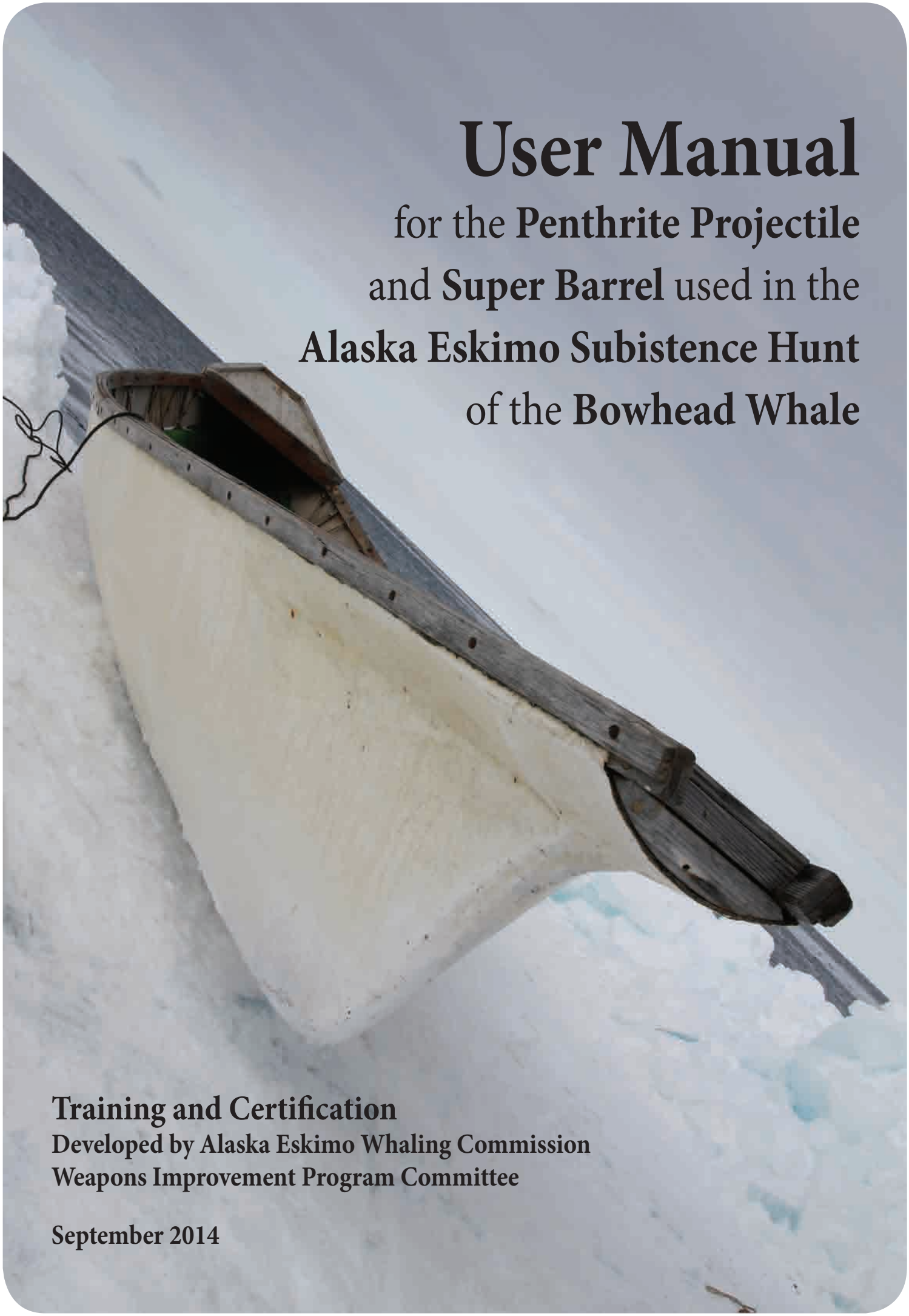

User Manual

for the **Penthrite Projectile** and **Super Barrel** used in the **Alaska Eskimo Subistence Hunt** of the **Bowhead Whale**

Training and Certification

Developed by Alaska Eskimo Whaling Commission
Weapons Improvement Program Committee

September 2014

ACKNOWLEDGEMENT

The Alaska Eskimo Whaling Commission (AEWC) would like to acknowledge the work that Dr. med. vet. Egil Ole Øen at the Norwegian School of Veterinary Science, Department of Arctic Veterinary Medicine, has done with the assistance of his doctoral student CVM Siri K. Knudsen, and Ms. Kirsten Zachariassen in putting the initial draft of this Manual together.

The AEWC also would like to acknowledge the Barrow Whaling Captains' Association in their cooperation and assistance in the usage of the Penthrite Projectile during its introductory phase and for their faithful reporting on the usage of the Penthrite during the initial years of its introduction to Alaska Bowhead hunts and to getting us to this phase of Training and Certification of the Penthrite usage.

The AEWC also acknowledges the work of the AEWC WIP Committee members: Chairman, Harry Brower, Jr., George Noongwook, Billy Adams, Jessica Lefevre, Price Leavitt, Sr. and Jenny Evans; Technical Consultants, Dr. Egil Oen and Jon Holmgren; Past Chairmen, Burton Rexford, Arnold Brower, Jr., Edward Hopson, Sr., Edward Itta; WIP Management Committee members: Luther Komonaseak, Fred "Simik" Kanayurak, Jacob Adams, Sr., Eugene Brower, Carl Kippi, and Johnny Aiken; and Dr. Tom Albert, Todd O'Hara, Dr. Craig George, Dr. Robert Suydam, Mike Philo (North Slope Borough Wildlife Management Science and Biology Advisory on the Penthrite and its Modifications).

INTRODUCTION

The Weapons Improvement Program (WIP) was developed in 1987 to guarantee high human safety standards and efficiency of the weapons used in the Northern Alaskan villages in the subsistence hunt of the bowhead whale. Historically, the efficiency in the bowhead whale subsistence averaged approximately 50 percent. In 1978, AEWC committed to the International Whaling Commission (IWC) to increase the efficiency to an average of 75 percent. In the recent years, the average efficiency rate of the bowhead subsistence hunt has been at least 75 percent and in some years well above 80 percent.

Implementation and usage of the penthrite projectile in the bowhead whale subsistence harvest as required by the IWC is a critical component of the AEWC's work to maintain the bowhead whale quota at the IWC. The struck and loss data collected over the past 20 years demonstrates a significant increase in efficiency with the use of the penthrite projectile. Use of the penthrite projectile can be partially credited with the AEWC's continued success of achieving a sufficient quota and the unrelenting use by whaling captains to prove it is more efficient.

HOLD HARMLESS AGREEMENT FOR TRAINING IN THE USE OF THE PENTHRHITE GRENADE AND THE SUPER BARREL

1.

a. I, _____, an AEWC registered Whaling Captain

from _____, Alaska, recognize that the Alaska Eskimo Whaling Commission (AEWC), at the direction of the International Whaling Commission, has caused the Penthrite Projectile to be designed and manufactured by a third party for use in the bowhead whale subsistence hunt.

b. I, _____, an AEWC registered Co-Captain

from _____, Alaska, recognize that the Alaska Eskimo Whaling Commission (AEWC), at the direction of the International Whaling Commission, has caused the Penthrite Projectile to be designed and manufactured by a third party for use in the bowhead whale subsistence hunt.

c. I, _____, an AEWC Harpooner

from_____, Alaska, recognize that the Alaska Eskimo Whaling Commission (AEWC), at the direction of the International Whaling Commission, has caused the Penthrite Projectile to be designed and manufactured by a third party for use in the bowhead whale subsistence hunt.

2. I understand that "Super Barrel" refers to the Darting Gun Brower Brass Barrel ("Triple B") designed specifically for use with the AWEC designed and manufactured Penthrite Projectile.

3. I understand that the "Penthrite Projectile" is composed of two parts, the Fuse Head Assembly which houses the safety and arming mechanisms, and Projectile Body Assembly which houses the penthrite charge, as well as all mechanical and pyrotechnical parts that make up those components, for use with the Super Barrel.

4. Together, the Penthrite Projectile and Super Barrel are referred to as the "Penthrite Projectile."

5. The AEWC is providing Penthrite Projectiles and training in their use as part of its mandate to protect the bowhead whale subsistence hunt, to assist whaling captains and crews in carrying out the responsible and humane killing of bowhead whales for subsistence use, and for the benefit of all bowhead subsistence Captains and crews, including myself.

6. I understand that the transportation, storage, assembly, handling and use of Penthrite Projectiles involve unique risks inherent with the use and handling of explosive materials, including the risk of death, serious bodily injury, and property damage to myself, to my crew members, and to other individuals and property that may be nearby.

HOLD HARMLESS AGREEMENT FOR TRAINING IN THE USE OF THE PENTHRHITE GRENADE AND THE SUPER BARREL

7. I hereby elect to voluntarily undertake the transportation, storage, assembly, handling, and use of Penthrite Projectiles knowing that these are inherently dangerous activities and may be hazardous to me, my property, my crew members, and other individuals and their property. I understand that these risks are inherent to the use of explosives and therefore cannot be eliminated. I understand that AEWC does not require me to use Penthrite Projectiles.

8. I am under no obligation to receive or to use a Penthrite Projectile. However, in undertaking to use Penthrite Projectiles provided by the **AEWC, I AGREE TO THE FOLLOWING CONDITIONS**:

    - I have read the current version of and understand the "*User's Manual for the Penthrite Projectile and Super Barrel Used in the Alaskan Eskimo Subsistence Hunt of the Bowhead Whale*" ("Hunter's Training Manual").

    - I have completed the AEWC training on how to store, transport, assemble, operate, dismantle and maintain the Penthrite Projectile.

    - I will use the Penthrite Projectile only as instructed in the current version of the Hunter's Training Manual and the AEWC training course.

    - I will use the Penthrite Projectile only with the Super Barrel, which has been specifically designed for use with the Penthrite Projectile.

    - I will ensure that my darting gun complies with the minimum trigger rod length specified by AEWC, and that my darting gun complies with all other modifications that have been specified by AEWC or in the future may be specified by AEWC.

9. I understand and accept that AEWC has sought to provide appropriate instruction and training on the transportation, storage, assembly, handling and use of the Penthrite Projectile, but neither AEWC nor its instructors are infallible. AEWC instructors and training materials may fail to give adequate warnings or instructions due to negligence, mistake, or failure to fully understand the participant's abilities.

10. I understand and accept that the Penthrite Projectile and all related equipment and supplies may malfunction or be defective, whether due to the negligence or other misconduct of an individual or due to some other cause or reason, and that such malfunction, defect, negligence, or other misconduct may result in death, serious injury, or property damage to myself, my crew, or other individuals.

11. By signing this agreement, I acknowledge that I AM ULTIMATELY RESPONSIBLE for my own safety when I use the Penthrite Projectile.

12. **RELEASE, ASSUMPTION OF RISK, AND WAIVER OF LIABILITY**: In consideration of being provided one or more Penthrite Projectiles for use in the bowhead whale subsistence hunt I expressly agree and promise to accept and assume full responsibility for all risks that may arise out of or result from my transportation, handling or use of the Penthrite Projectile, including specifically risk of personal injury, death, and property damage to myself, my crew, or other individuals. I further release, waive, discharge and covenant not to sue the AEWC, its parents, subsidiaries or other affiliates, officers, directors,

employees, representatives or agents **("Releasees")** from any and all claims, suits, liabilities, judgments, costs and expenses for any death, serious bodily injury, property damage, and any other loss arising from or relating to transportation, use or operation of Penthrite Projectiles to the full extent permitted by law, including any and all claims or liabilities resulting from the negligence of the AEWC or its officers, directors, employees, agents and representatives, past or present, regardless of whether such liability arises in tort, contract, strict liability or otherwise.

13. **WHALING CAPTAINS ONLY**: As the Captain of _____crew, I accept full responsibility for any use or misuse of the Penthrite Projectile and Super Barrel by any member of my crew.

14. It is my express intent that this Release and Hold Harmless Agreement for Training in the Use of the Penthrite Grenade and Super Barrel shall bind my family members, spouse, heirs, assigns, personal representatives and anyone else entitled to act on my behalf to the extent they act on my behalf, and is deemed as a release, waiver, discharge and covenant not to sue the Releasees.

15. I further covenant and agree that this Release and Hold Harmless Agreement for Training in the Use of the Penthrite Grenade and Super Barrel shall be construed in accordance with the laws of the State of Alaska and that any mediation, suit or other proceeding relating to this Release and any activities covered hereby must be filed or entered into only in Alaska and the federal or state courts of Alaska. Any portion of this Release deemed unlawful or unenforceable is severable and shall be stricken without any effect on the enforceability of the Release as a whole to the full extent authorized by law.

16. **By signing this document, I acknowledge that if anyone is hurt or killed or property is damaged or destroyed due to my transportation, handling or use of the Penthrite Projectile, I may be found by a court of law to have waived my right to assert a claim or maintain a lawsuit against AEWC its officers, directors, employees, agents and representatives, on the basis of any claim from which I have released them in this Release and Hold Harmless Agreement for Training in the Use of the Penthrite Grenade and Super Barrel**.

    I HAVE HAD SUFFICIENT OPPORTUNITY TO READ THIS ENTIRE DOCUMENT. I HAVE READ AND UNDERSTOOD IT, AND I AGREE TO BE BOUND BY ITS TERMS.

_____	_____
FOR AEWC [SIGNATURE]	FOR AEWC [PRINT NAME]
_____	_____
CAPTAIN [SIGNATURE]	CAPTAIN [PRINT NAME]
_____	
DATE	

HOLD HARMLESS AGREEMENT FOR TRAINING IN THE USE OF THE PENTHRHITE GRENADE AND THE SUPER BARREL

_____ _____

CO-CAPTAIN [SIGNATURE] CO-CAPTAIN [PRINT NAME]

_____

DATE

_____ _____

HARPOONER [SIGNATURE] HARPOONER [PRINT NAME]

_____

DATE

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PREFACE

The penthrite grenade described in this booklet is designed for use only in the Darting Gun with the "Super Barrel" that Alaskan Eskimos use in their subsistence hunt of bowhead whales. The grenade shall not be used for other purposes or in any weapons other than the Darting Gun with the Super Barrel. This training manual may be used to support the oral instructions given in AEWC-sponsored weapons workshops for whaling captains, co-captains and harpooners of each registered whaling crew, and as a handbook for hunters using the Penthrite Projectile.

The training manual contains a brief description of the projectile's design and function, as well as its safe handling, transport and maintenance. To ensure maximum efficiency in the hunt, and to protect whaling crews from accidents or injuries, all users of the penthrite projectile are required to follow the instructions and to handle and use the projectile as described in this booklet.

General information about explosives is useful in understanding and appreciating the projectile's safety mechanisms. An explosive is a solid or liquid substance which, when triggered into a chemical reaction, turns into gas that expands, violently, outward in high energy shock waves. Primary conventional explosives, like the black powder used in the traditional black powder projectiles, are very sensitive. Heat, pressure, friction, mechanical shock or electricity can cause them to explode. Secondary explosives, like penthrite (PETN), are much more stable, but carry greater explosive power. Therefore, if used correctly, the Penthrite Projectile is perfect for use in the bowhead whale subsistence hunt because it is both safer and more effective than black powder projectiles.

It is very important to remember that both major parts of the projectile, the Fuse Head and the Body of the Penthrite Projectile, contain explosives: no one should ever tamper with or open any part of the projectile.

Penthrite does not affect the usefulness or taste of whale meat because it does not dissolve in water, and upon detonation it breaks down into natural gases and water. Also, penthrite is thermally the most stable and least reactive of its category of explosives. Finally, penthrite has proven to be very efficient in causing a whale to become unconscious almost instantly and causes quick death by producing "pulses" of shock and pressure waves that travel at hypersonic speed in all directions, causing severe damage to vital organs. Massive "lacerations," or cuts, usually occur at the detonation site, and injuries and bleeding often are found in the brain, heart, lungs and other vital organs.

When properly aimed, the penthrite grenade is more efficient than the black powder grenade in two respects: First, it is more powerful. Second, a hunter may take aim at a broader area of the whale's body to achieve almost instantaneous whale death in comparison to the traditional black powder grenade. Even so, hunters can expect the rapid death only when the grenade explodes in or near the chest (thorax), spine, neck and skull. These vital regions of the animal are the most vulnerable, so hunters should always aim their weapons carefully to ensure the quickest and most humane death, as in other forms of wildlife hunting.

Drøbak, Norway, September 2014

Dr. Egil Ole Øen

1.0 CRITICAL SAFETY INFORMATION

READ BEFORE AND AFTER READING USER'S MANUAL

1. SHIPMENT AND STORAGE. For shipment and storage, the Fuse Heads and Bodies are packed separately in shock-absorbing material, in separate metal transport cases. During transport and storage, the Fuse Head and the Body must always be kept separate and dry.

2. NO TOOLS IN FUSE HEAD. Never insert any tool or hard object into the threaded part of the Fuse Head, except the plastic plug that protects the threads and the detonator.

3. DON'T MOVE A LOCKED STIRRUP. Never attempt to force the Stirrup "up" to ("safe") position once it has been pushed fully back and "down" (flush with the Body) and locked into place ("armed") position. Doing so could cause accidental firing of the detonator.

4. STIRRUP PRECAUTIONS. Never lift the Fuse Head by the Stirrup. Avoid pressure and blows to the Stirrup.

5. NO TOOLS FOR ASSEMBLY. Never use any tools to assemble the Fuse Head and Body. If Fuse Head and Body cannot be assembled using only hands, the devices should be put back into their shock absorbing wrappings and, if available, their transport cases. They should then be returned to the AEWC village commissioner or the AEWC office.

6. NO TOOLS TO INSERT PROJECTILE. Never use any tools to insert the Projectile into the Darting Gun barrel. Keep the washer smooth by using recommended non-oil lubricants that can withstand below freezing temperatures, such as graphite.

7. NO TOOLS TO REMOVE PROJECTILE. Never use any tools to remove the Projectile from the Darting Gun barrel or to dismantle the Projectile Assembly. Do not pull the Projectile out by the Stirrup.

8. ONLY THE TRIPLE B BARREL. Never use the Penthrite Projectile in darting guns that are not equipped with the "Triple B Super Barrel."

9. ONLY RECOMMENDED PROPELLANT CHARGES. Only use recommended correct propellant charges for firing the Penthrite Projectile: The AEWC recommends the use of the AEWC-provided 65 grain Pyrodex RS black powder substitute (equivalent to 80 grains ffG black powder), encased in waterproof shell casing, or other charges as recommended by the AEWC in the future.

10. RETURN DAMAGED FUSE HEADS AND BODIES: NEVER ATTEMPT TO REPAIR. Place damage Fuse Heads and Bodies back into their separate shock-absorbing wrappings and transport cases, if available, and return them to the AEWC village commissioner or the AEWC office. Never attempt to repair a damaged head or body.

2.0 USER'S MANUAL

NOTE: TRANSPORTATION AND STORAGE
For shipment, the Fuse Heads and Bodies are packed separately in shock-absorbing material, in separate metal transport cases. During transport and storage, the Fuse Head and the Body must always be kept separate. Make sure that the steel split pin is secured in the Fuse Head at all times.

2.1 Short Description of Projectile

The Complete Projectile Assembly is composed of two major parts:

1. **The Fuse Head Assembly (Fuse Head)**: Transportation safety steel split pin ("split pin") is attached to the tip of the Fuse Head. The Fuse Head houses (1) the pyrotechnical parts that function to set off the charge, and (2) several safety and arming mechanisms ("SAM"), which ensure detonation occurs at the desired time and not before.
2. **The Body Assembly (Body)**: The Body houses the penthrite (explosive) charge.

2.2 Assembling Fuse Head and Body

1. Remove and save the reusable plastic plug from the Fuse Head and the reusable plastic cap from the Body. (Fig. 1). An aluminum cap protrudes from the connector on the tip of the Body. Be careful not to damage it. If the aluminum cap is damaged, do not use the Body.

Figure 1 Removal of plastic plug from the Fuse Head

2. Take the Fuse Head in one hand, with the "Stirrup" in its upward, "safe" position, placed between the ring finger and little finger (Fig. 2).

Figure 2 Assembling the Body and Fuse Head of the Penthrite Projectile.

3. Screw the Body firmly into the Fuse Head until it stops (Fig. 3). **Do not use tools!**

REMEMBER:
If the Stirrup gets pushed backward and locked into "armed" position, never try to return it to "safe" position!!

Figure 3 Assembling of Body and Fuse Head of the Penthrite Projectile.

IF THE FUSE HEAD HAS BEEN DAMAGED, OR THE STIRRUP HAS BEEN ACCIDENTALLY ROTATED SO THAT IT IS FLUSH WITH THE FUSE HEAD AND LOCKED INTO PLACE, DO NOT ATTEMPT TO USE THE DAMAGED FUSE HEAD. Replace the protective plug in the rear end, place the Fuse Head in its shock absorbing wrapping, and return it to the AEWC Commissioner for your village.

2.3 Loading the Propellant Charge

1. **65 grains Pyrodex RS black powder substitute (equivalent to 80 grains ffG black powder) must be used for the propellant charge**.
2. Wads must be placed so they are flush with surface of the shell. This will be necessary for seating the projectile to the propellant shell.

2.4 Loading the Darting Gun

The firing pin must be checked or reset after purchasing a new Darting Gun to make sure it does not protrude too far out to cause a misfire of the propellant charge while screwing the barrel on the darting gun. The following are sequences or procedures in loading the Darting Gun:

1. Make sure the work area is clear of obstruction. Keep clear of the front of the barrel.
2. Make sure the striker pin moves freely before loading the Darting Gun.
3. Place the propellant charge into the barrel.
4. All whaling captains should purchase trigger rods at a standard length of 26" (twenty-six inches) to get a minimal distance of 4" (four inches) between the end cap of the trigger rod and the tip of the fuse head.
5. Hold the Darting Gun firmly, insert the Darting Gun barrel, and screw the two parts together.
6. Using the cocking tool, cock the hammer, seating the barrel until it is tightened.

7. Set the trigger rod in place and insert the safety pin. Re-install the threaded end cap on the trigger rod. The distance between the end cap of the trigger rod and the tip of the fuse head must be no less than 4” (four inches). Shortening this distance could result in a malfunction of the darting gun and penthrite projectile. The distance between the end of the trigger rod and tip of the harpoon must be no less than 12” (twelve inches).

8. Keeping clear of the front of the barrel, place the Projectile Body in the Darting Gun barrel, with the "Stirrup" resting in its seat. When the Projectile is positioned correctly in the barrel, the washer will be seated firmly against the wadding of the propellant shell (Figs 4 and 5).
9. Set the loaded Darting Gun in a safe place, like the front of the boat or along the ice edge.
10. Attach the harpoon and float line to the Darting Gun.

Figure 4 To make sure the Projectile is secure against the wadding of the propellant shell, a blank shell can be used to check the fit.

2.5 Removal of the Safety Steel Split Pin in the Fuse and on the Trigger Rod

Remember to remove the two safety steel split pins. 1) One in the front of the Fuse Head, and 2) the second safety split pin on the trigger rod, before throwing the Darting Gun to strike a Bowhead Whale. Keep the steel split pin in case you need to re-insert it into the Fuse Head (Fig. 5).

Figure 5 The transport security steel split pin must be removed before the Darting Gun is thrown.

2.6 Unloading the Darting Gun

The following are sequences or procedures for unloading a fully loaded Darting Gun

1. Make sure work area is clear of obstruction. Keep clear of the front of the barrel.
2. Re-install the two safety steel split pins: 1) on the trigger rod for the propellant charge, and 2) on the tip of the Fuse Head Assembly (Fig. 6).
3. Separate the line and harpoon from the Darting Gun.
4. Then, while holding the Darting Gun firmly with one hand, and using the other hand to hold the Fuse Head Assembly, pull and remove the Projectile from the Darting Gun barrel.
5. Set the Projectile down and continue to dismantle the Darting Gun.
6. Remove the threaded end cap from the trigger rod.
7. Set the cocking tool in place: again, hold the cocking tool firmly and pull out the safety steel split pin. Slightly cock the hammer, and then remove the trigger rod.
8. Still holding the cocking tool firmly, unscrew the barrel from the Darting Gun to prevent vacuum build up (Fig. 7.).
9. Slowly release the hammer. Before removing the Projectile from the super barrel, make sure you remove the super barrel from the darting gun first. This is to release the vacuum build-up while trying to remove the assembled projectile from the loaded Darting Gun.
10. Remove the propellant charge from the barrel and stow away.

Figure 6 Re-inserting the steel split pin into the Fuse Head before removing Penthrite Projectile from the Darting Gun.

Figure 7 Separating barrel and Darting Gun.

Figure 8 Removing the barrel from Darting Gun

Figure 9 Removing Darting Gun Shell Assembly.

2.7 The Dismantling of the Projectile Assembly (Fuse Head and Body)

If the Darting Gun is not fired, the Projectile Assembly (Fuse Head and Body) should always be dismantled, and the Fuse Head and the Body packed into their separate shock-absorbing wrappings. No tools are needed for dismantling the Projectile.

1. After the projectile is removed from the Darting Gun, dismantle the Fuse Head from the Body by turning the Body to the left with one hand while holding the Fuse Head with the other hand. Keep the Stirrup in its upward "safe" position between ring finger and little finger (Fig. 10).
2. Remove water and snow from Fuse Head and Body with a soft, clean rag.

3. Re-install the plastic plug to the Fuse Head and the plastic cap on the Body (Fig. 11).
4. Make sure the safety steel split pin is secured.
5. Place each item in its separate shock absorbing wrapping (Fig. 12).
6. Return the Penthrite Projectile Fuse Head and Body to their transport cases for storage when not in use (Fig 13).
7. At the end of the season, any unused Fuse Heads and Bodies should be given to the AEWC village commissioner or the AEWC office for storage in the transport cases. (See also Section II, F and G, Figs. 12 and 13.)

Figure 10 Disassembling Fuse Head and Body.

Figure 11 Putting on protective plastic cap and plug.

Figure 12 Packing the Fuse Head in shock absorbing wrapping.

3.0 DESCRIPTION OF THE DARTING GUN PENTHRITE PROJECTILE

As described in Section II.A, the Penthrite Projectile for the Darting Gun is composed of two major parts: The Fuse Head Assembly and the Body Assembly.

Numbers in parentheses correspond to the numbers in Figs. 15 and 16 on the following page.

3.1 Fuse Head Assembly: Design and Function

The Fuse Head Assembly's (Fuse Head) main functions are to set off the penthrite charge in the Body Assembly, and to ensure that detonation occurs at the desired time. The housing of the Fuse Head (1) is a cylindrical body made of titanium with a central, cylindrical, longitudinal bore and a cylindrical, transverse bore. The Fuse Head has a conical part in the front end and a threaded part in the rear end for connection to the Body Assembly. The Fuse Head houses a number of movable parts made of titanium and stainless steel, pyro-technicals, and safe and arming mechanisms ("SAM") (Figs. 13, 14, and 15).

Figure 13 Fuse Head with inserted transport security steel split pin and red warning flag (one steel split pin at the each end of the flag).

3.1.1 Fuse and Body Diagrams

Fuse Head Assembly (Fig. 15) and Body Assembly (Fig. 16).

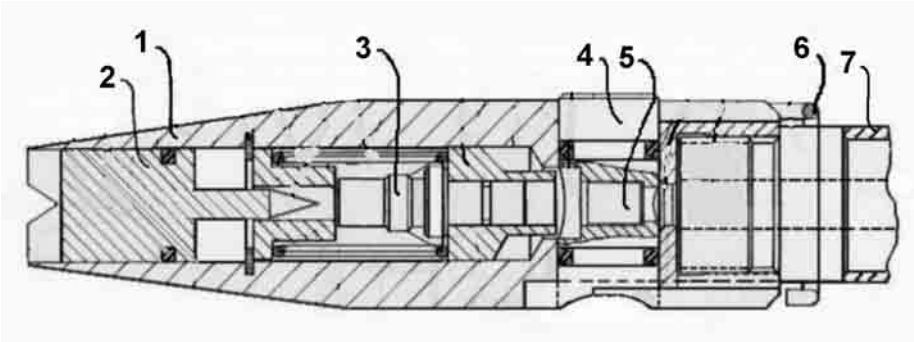


Figure 14 Fuse Head Assembly of Penthrite Projectile (longitudinal section view).

1. Housing of Fuse Head Assembly
2. Ignition plunger with striker pin
3. Time Delay Fuse
4. Detonator Housing
5. Detonator
6. Stirrup in "armed" position
7. Body Assembly

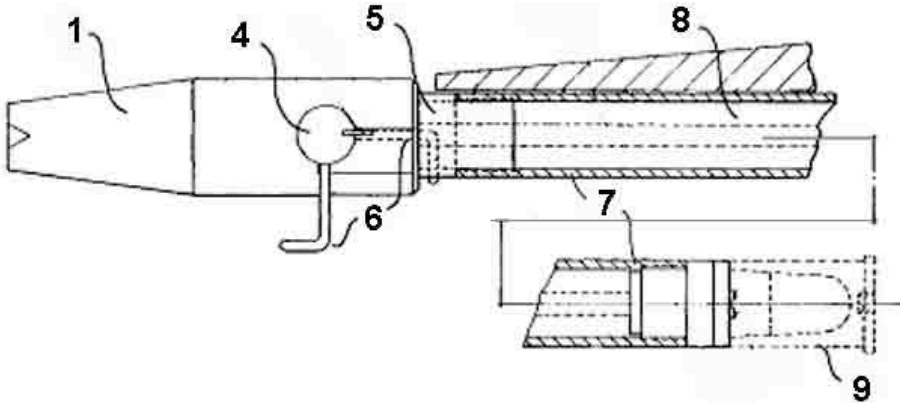


Figure 15 The Body Assembly (broken) with propellant shell and part of barrel of the Darting Gun (striped). The Stirrup is shown both in "safe" position (unbroken line) and "armed" position (dotted line).

1. Fuse Head Assembly
4. Detonator Housing
6. Stirrup
7. Body Assembly Shaft
8. Pressed Penthrite
9. Darting Gun Shell

3.1.2 Ignition plunger and striker pin

The nose of the Fuse Head houses an ignition plunger (2) with a striker pin held in place by a strong (transport security) steel split pin ("steel split pin") with a red warning flag and a breakable bronze shear pin ("plunger shear pin"). The steel split pin does not break on its own, so it must be removed before the Penthrite Projectile is fired. During transport, the steel split pin holds the striker pin at a safe distance from the time delay fuse (3). As long as the steel split pin is in place, no pyrotechnical parts will be set off. When the steel split pin has been removed, the plunger shear pin continues to hold the striker pin in place, at a safe distance from the time delay fuse.

When the tip of the Fuse Head strikes a target, the plunger shear pin breaks; the ignition plunger with its striker pin (2) is pushed rearward and moves into and ignites the time delay fuse (3).

> *HUNTER QUESTION: What if I throw the Darting Gun but miss the whale? Can I re-use the Fuse Head?*
>
> *ANSWER:* IT DEPENDS. You can only re-use the Fuse Head if the plunger shear pin is intact and unbroken.

If the hunter throws the Darting Gun at a whale and misses, the Darting Gun with the Penthrite Projectile can be retrieved from the water and reused for another strike as long as the plunger shear pin on the Fuse Head is still intact and unbroken.

> *HUNTER QUESTION: What if the Darting Gun fires the Projectile into the whale, but then the penthrite doesn't detonate? Can I re-use the Fuse Head?*
>
> *ANSWER:* NO. You cannot re-use the Fuse Head if it penetrates the whale.

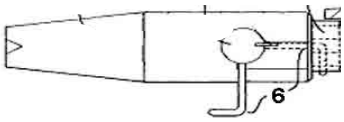
If the hunter strikes the whale and the tip of the Projectile penetrates but does not detonate, the hunter should NEVER attempt to re-use or repair the Fuse Head, because the plunger shear pin will be broken so that the time delay fuse has been engaged (at penetration of the whale), disarming the Fuse Head. Instead, the hunter must return the Fuse Head to the AEWC village commissioner or the AEWC office.

3.1.3 Time delay fuse

The time delay fuse (3) is seated in a locking piece. It has a time delay of 4.5 ± 0.5 seconds and is arranged to fire a detonator (5) which is housed in a cylindrical detonator housing (4).

NOTE: The time delay fuse of a Projectile that has hit a whale (whether or not the Darting Gun fires) will be triggered and set off by the striker pin. This will disarm the Fuse Head. The Fuse Head cannot be re-used and should be returned to the AEWC village commissioner or the AEWC office.

3.1.4 Detonator housing with the Stirrup



The detonator housing (4) rotates around a transverse axis by means of an outer mechanical safety device that looks like a Stirrup (6). In "safe" or non-activated position, this Stirrup protrudes sideways out from the Fuse Head at a 90-degree angle (Fig. 15) and is held in this position by a second bronze shear pin ("stirrup shear pin"). When the Stirrup is in "safe" position, the time delay fuse is pressed against the closed portion of the cylindrical detonator housing by a solid coiled spring and is unable to engage with the detonator. The stirrup shear pin in the detonator housing might break if the Fuse Head is treated carelessly or is dropped, and the Stirrup hits the ground.

When the Stirrup penetrates into the tissues (flesh) of the whale, the stirrup shear pin in the detonator housing ruptures when the Stirrup hits the surface of the target. The Stirrup is then forced backwards until it is flush with the outer surface of the Body (Fig. 14), turning the detonator housing by 90 degrees and putting the detonator into "armed" position (lined up with the striker pin and the time delay fuse, ready to be fired). When the detonator housing is turned, the coiled spring will push the time delay fuse into a chamber in the detonator housing, where it comes in close enough contact with the detonator to set it off.

When the hunter throws the Darting Gun and strikes a whale, and the Projectile penetrates into the flesh, the stirrup shear pin will break. The time delay fuse is triggered by the striker pin, before the Stirrup with the detonator housing is turned down from its "safe" position. This design prevents the delay fuse from entering the detonator housing and reaching the detonator, unless the Projectile penetrates deeply enough to drive the Stirrup back against the body of the Projectile.

If a hunter unintentionally moves the Stirrup into the "armed" position, a safety mechanism in the Fuse Head disarms the Fuse Head. A coiled spring pushes the time delay fuse into the detonator housing, beyond the reach of the striker pin. Here, a built-in stopper mechanism prevents the striker pin from moving deep enough into the Fuse Head to reach/fire the time delay fuse. Accordingly, a premature movement of the Stirrup into "armed" position actually disarms the Fuse Head.

NEVER MOVE THE STIRRUP BACK INTO "SAFETY ON" POSITION MANUALLY. Any attempt to "repair" the Fuse Head and detonator housing by forcing the Stirrup back into "safe" position may cause accidental firing.

3.1.5 Transport Safety Mechanisms

The ignition plunger is equipped with a transport security steel split pin that fixes the plunger in a secure position during transport, handling and preparation of the Projectile in the field. The steel split pin keeps the ignition plunger and striker pin from unexpectedly moving into the time delay fuse and causing the premature firing of the time delay fuse. A red warning flag (Fig. 16) is attached to this steel split pin to remind users to treat the Fuse Head carefully because it contains explosives, and to remove the steel split pin before throwing the Darting Gun. A steel split pin is attached to either end of the flag to provide an extra steel split pin.

As a backup safety device, a plunger shear pin also holds the ignition plunger in place. It performs the same function as the steel split pin because it is designed to keep the plunger and striker pin in a secure position after removal of the steel split pin. The plunger shear pin breaks when the Projectile hits the body of a whale, allowing the plunger and striker pin to move into the time delay fuse.

IF THE PLUNGER SHEAR PIN IS DAMAGED, DO NOT USE THE FUSE HEAD. Instead, re-insert the steel split pin into the Fuse Head, if possible. Return it to the AEWC village commissioner or the AEWC office.

Figure 16 The Penthrite Projectile mounted in the Darting Gun. The transport security steel split pin and the warning flag (note the extra split pin) are still attached.

The rear opening of the Fuse Head is equipped with a plastic plug to protect the threads from damage and prevent water and snow from entering during transport and storage (Fig. 18). All internal moveable parts that might be exposed to moisture are equipped with O-ring seals. DO NOT USE THE PENTHRITE PROJECTILE IF THE O-RING IS DAMAGED OR HAS A KINK.

Figure 17 Removing the plastic plug from the Fuse Head.

3.2 The Body Assembly of the Penthrite Projectile: Design and Function

The Body Assembly of the Penthrite Projectile is a stainless steel tubular shaft (Fig. 19) with a threaded connection piece in the front end (Fig. 20) and a sealed plug with a washer and a screw in the rear end (Fig. 21). The Body Assembly houses the explosive charge of 22 grams of pressed penthrite and a pole of wood. The end plug with the washer is sealed with an O-ring, creating an effective seal between the penthrite charge and the black powder propellant charge.

Figure 18 Body of the Penthrite Projectile.

Figure 19 The threaded connector for the Body and a plastic cap to protect the threads and the aluminum cap.

Figure 20 The rear end plug of the Body with washer and screw.
(The rubber stopper at the base of "super bomb" can be inverted to ensure it stays in the super barrel.)

HUNTER QUESTION: If I throw the Darting Gun and miss the whale, can I re-use the Body, or do I have to attach a new Body to the Fuse Head after I pull it out of the water?

ANSWER: IT DEPENDS. You can only use the Body if its aluminum cap is undamaged.

The Body is designed so that, if the hunter throws the Darting Gun but fails to hit a whale, the Body can be re-used for another shot, provided the aluminum cap in the front remains intact and undamaged. If the hunter actually strikes a whale, but the Darting Gun fails and does not fire the Projectile into the whale, the Body may only be reused if the aluminum cap in the front is intact and undamaged. DO NOT REUSE THE BODY IF ALUMINIUM CAP IS DAMAGED.

4.0 SAFETY MEASURES

The operation of the various devices in the Fuse Head must occur in correct sequence if the Fuse Head is to fire the main charge. The correct operational sequence is absolutely critical to the safe use of the Penthrite Projectile. The built-in safety measures are as follows:

A. The fact that the Fuse Head and the Body are kept separate during storage and transport.

B. A transport security steel split pin fixed through the Fuse Head's ignition plunger and striker pin; this can be re-secured if necessary.

C. A plunger shear pin fixed through the Fuse Head's ignition plunger and striker pin for safe handling after removal of the transport security steel split pin.

D. Detonator protection (I): Stopper devices create a physical barrier that prevents the striker pin from penetrating the time delay fuse beyond a predetermined depth.

E. Detonator protection (II): At premature rotation of the Stirrup, the delay fuse enters a chamber in the detonator housing so that the striker pin is kept at too great a distance from the time delay fuse to reach and ignite it.

F. Detonator protection (III): A second bronze shear pin ("stirrup shear pin") that secures the detonator housing and Stirrup in a "safe" (non-activated) position until the Projectile penetrates the target. The stirrup shear pin keeps the detonator housing in a position that creates a physical barrier between the time delay fuse and the detonator, and between the detonator and the penthrite charge. This barrier protects the Projectile from being detonated if a user prematurely triggers the striker pin.

G. Detonator protection (IV): An O-ring on a locking piece that prevents exhaust/heat/flames from the burning delay fuse from bypassing the fuse and the locking piece, prematurely firing the detonator. Do not use Penthrite Projectile if the O-ring is damaged or has a kink.

H. In addition to safety mechanisms in the Fuse Head, supporting safety mechanisms in the Body protect against possible misfiring of the penthrite charge due to acceleration and impact forces during firing of the Darting Gun and at impact with the target.

5.0 THE PENTHRITE PROJECTILE – MANNER OF OPERATION

(**Note**: Numbers in brackets refer to Figs. 14 and 15)

A. When the Darting Gun has been fired, the Projectile will plunge into and penetrate the tissues (muktuk and musculature) of the whale. When the front end of the Fuse Head hits the target, the striking force at penetration will break the plunger shear pin, allowing the plunger with the striker pin (2) to be forced backwards against the stopper devices (Detonator protection I) and the time delay fuse (3), where the striker pin will ignite (activate) the time delay fuse after penetrating it to a predetermined depth.

B. After the striker pin activates the time delay fuse, the time delay fuse (3) burns for approximately 4.5 seconds.

C. As the Fuse Head penetrates further into the whale, the Stirrup (6) does two things: First, the Stirrup moves to a position flush with the outer surface of the Fuse Head and Body, rendering almost no resistance to the Projectile as the Projectile further penetrates into the whale body. Second, the movement of the Stirrup breaks the stirrup shear pin, allowing the detonator housing (4) to turn by 90 degrees into "armed" position.

D. The detonator housing, locked in “armed” position, allows the now-ignited time delay fuse to enter into a chamber of the detonator housing (4), where it lines up with the detonator. At this point, the detonator (5) is in close contact with both the burning time delay fuse and the penthrite charge of the Body. In this aligned position, the detonator is ready to set off the penthrite charge as soon as it is triggered by the time delay fuse (after 4.5 seconds).

E. If the detonator housing is rotated accidentally before the time delay fuse has been ignited, the time delay fuse is immediately moved safely out of reach of the striker pin. Accordingly, the striker pin cannot ignite the time delay fuse (Detonator protection II). This means that the Fuse Head is disarmed and cannot be used.

*PLEASE RETURN TO **PAGE 1** FOR CRITICAL SAFETY INFORMATION.*