

MILITARY WEAPONS FOR AVALANCHE CONTROL PROGRAM

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ABSTRACT

Military weapons were first used to control avalanches in North America in 1949 at Alta Ski Area, Utah and Berthoud Pass, Colorado. Military weapons proved remarkably successful and use quickly expanded; today, thirteen Forest Service permitted ski areas, five state departments of transportation, one state owned railroad, the British Columbia Department of Highways, Parks Canada, and several private operations mostly use 75mm and 105mm recoilless rifles for avalanche control. Many of these users literally depend upon 75mm and 105mm recoilless rifles, last manufactured in the late 1940's and early 1950's, for public safety and economic viability; unfortunately, only about a five year supply of these weapons and ordnance exist. A coalition of Canadian and American users have formed in a effort to keep the program alive. The coalition's objectives include agreeing on methods to best prolong the current program, researching military and non-military alternatives to the current program, and developing a long term future program. The coalition has considered many alternatives including additional military weapons, privately manufacturing weapons and ordnance, Avalaunchers and other gas powered explosive propellant devices, the Gaz-Ex propane explosive device, and the Bolt Tech high pressure air gun.

INTRODUCTION

Thirteen US ski areas, six state departments of transportation, British Columbia Highway Department, Parks Canada, Yellowstone National Park and several private companies in Canada depend upon military weapons for economic viability and public safety. Without military weapons to control avalanches, these agencies and companies would lose millions of dollars from closed highways and closed ski areas.

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The economic importance of avalanche control was graphically illustrated this past winter when record snows in the Cascades forced Washington state to close all the mountain passes linking eastern and western Washington for four days, despite the highway department's state of the art avalanche control program. Washington state estimated they lost 2.5 million dollars in commerce revenues during the four day closure. Without military weapons, they would have had to leave the passes closed even longer and would have lost several times that amount.

The first successful use of military weapons for avalanche control in the United States occurred in March 1949 in Alta, Utah. Forest Service snow ranger Monte Atwater, Wasatch Forest Supervisor Felix Koziol and others patterned the initial US effort after European programs which had been in place for several years. Atwater and Koziol persuaded the commander of the Utah National Guard to fire 15 rounds from a 75mm French howitzer at selected avalanche starting zones in and around Alta. The initial firing was a great success, but the Army was uneasy about using military weapons for non-military purposes and was reluctant to commit their use for an avalanche control program. To further complicate matters, the Forest Service wasn't thrilled about firing military weapons onto the National Forest and they definitely didn't want Forest Service personnel doing it, so they required all shooting be done by Utah National Guard troops. This requirement was unworkable. The National Guard could not afford to station troops at Alta so they had to travel up Little Cottonwood Canyon highway, which was often closed because of heavy snows and high avalanche hazard. In short, the troops couldn't get up the road to the military weapons to control the avalanches that closed the highway to begin with. A definite case of "Catch 22." These bureaucratic entanglements frustrated Atwater, so he took matters into his own hands and fired the weapons himself. This angered some high ranking Forest Service officials and, for a time, it looked like the Forest Service might scrape the program, and probably would have except for a chance meeting of Monte Atwater and John Herbert. Herbert was an ardent skier and the Forest Service Assistant Chief of Recreation and Lands in Washington DC. Monte convinced Herbert that the program was the wave of the avalanche future and if the Forest Service was going to develop ski areas they needed military weapons to control avalanches. Herbert bought off on Atwater's argument and went to work and convinced the Forest Service and the Army hierarchies to commit to a military weapons for avalanche control program including allowing Forest Service personnel to fire the weapons during emergencies. Of course, it was easy to label practically every firing mission an emergency and within a year it was standard procedure for Atwater to do all the shooting at Alta.

The success at Alta was replicated almost simultaneously at Berthoud Pass, Colorado. Several other ski areas and highway departments quickly followed and within ten years military weapons were a standard tool for avalanche control. Since the initial shooting in 1949, the Forest Service and highway departments have tested several types of military weapons including mortars, but, until very

recently, have exclusively used 75mm pack howitzers and 75mm and 105mm recoilless rifles.

Pack howitzers were first manufactured in the early 1940's and were used extensively in World War II. Pack howitzers are an ideal avalanche control weapon; they are sturdy, accurate, easy to shoot and have a long life. Pack howitzers were designed to be pulled by mules or trucks which is why the Army attached the "pack" to pack howitzer.

Seventy-five millimeter and 105mm recoilless rifles were first manufactured in the late 1940's and were used extensively in the Korean War. Recoilless rifles were designed as light weight weapons that could be easily transported and could be shot from a Jeep. Unlike howitzers, recoilless rifles literally do not recoil; their breeches are vented which allows equal energy dissipation out the front and the rear of the weapon and negates the recoil. The Army requires that recoilless rifles be scraped after 2000 rounds and that vents be changed every 500 rounds. Seventy-five millimeter and 105mm recoilless rifles are ideal avalanche control weapons and are the backbone of the Forest Service ski areas and state departments of transportation control programs.

Army agreements with the Forest Service and state departments of transportation to provide weapons and ammunition to them to control avalanches restrict the use of military weapons for avalanche control to Federal and state agencies. Consequently, only Forest Service permitted ski areas and state departments of transportation can legally shoot Army provided military weapons. The Forest Service originally performed all avalanche control, including funding and shooting military weapons, for their permitted ski areas. However, beginning in the late 1960's and early 1970's they turned those responsibilities over to individual ski areas. The Forest Service, because of the Federal law prohibiting private ski areas from shooting military weapons, continues to manage the military weapons program and hires personnel, usually ski patrollers, to shoot the weapons. The ski areas reimburse the Forest Service, through cooperative agreements, for most of their expenses including paying all ammunition and weapons costs and paying gunners' salaries.

Forest Service ski areas and state highway departments have had remarkable success the past forty years using 75mm pack howitzers and 75mm and 105mm recoilless rifles to control avalanches; unfortunately, the Army is nearly out of serviceable ammunition for these weapons. Since many ski areas and highway departments depend so completely on these weapons for avalanche control, this news is bad news; consequently, Forest Service, ski area and highway department avalanche personnel have been scrambling the past few years to find alternatives to current military weapons systems.

The scrambling began in earnest when a bunker of 105mm recoilless rifle propellant exploded in Kentucky and, as a consequence, the Army invoked a moratorium in September 1985 on the use of 75mm and

105mm recoilless rifle ammunition. The Army conducted tests on 75mm and 105mm recoilless rifle ammunition and determined that the explosion in Kentucky was specific to inadequate storage at the particular bunker and that properly stored recoilless ammunition would not spontaneously explode. Based on those tests, the Army lifted the moratorium right before ski season. Nevertheless, the experience shook avalanche control personnel and they began to think "maybe there isn't an endless supply of reliable military ammunition out there after all." About this time, John Anderson became the Forest Service Washington Office winter sports specialist and Lieutenant Colonel Barbara Yost became the Pentagon officer in charge of allocating Army military weapons and ammunition for the avalanche control program. Individually they brought new energy and enthusiasm to their jobs. Forest Service, DOT, and ski area field personnel convinced Anderson and Yost that the program was vitally important to the safety and economic viability of states and the ski industry and that it must be actively managed. Anderson recognized that no non-military system could replace military weapons, so he committed the Forest Service to not only managing the program, but to actively procuring another military weapons system and developing a non-military system. Anderson's strategy included establishing the Forest Service national military weapons field coordinator position which I filled. Colonel Yost provided accurate inventories of remaining Army ammunition stocks, which were shockingly low, and set about building a foundation to allow the Forest Service and highway departments access to other military weapons such as the 106mm recoilless rifle and 105 howitzer. Colonel Yost also confirmed what many had long suspected, that the avalanche control program was competing with foreign governments, including Canada, for military weapons and ammunition. To remedy the situation, Colonel Yost arranged with the Army to freeze remaining supplies of recoilless rifle ammunition for avalanche control, this was a nice gesture, but too late to be of much practical importance.

As if dwindling supplies weren't enough, the dud rate for 75mm recoilless rifle base detonating ammunition began to sky rocket around 1987. Forest Service policy strives for less than a three percent dud rate for military ammunition, which the Forest Service had achieved over the course of the program, but suddenly Forest Service ski area gunners were getting up to thirty percent dud rates during individual firing missions. Naturally people were alarmed and began to look for patterns to determine if certain lots of ammunition were faulty or if firing practices were to blame or if there was some other inobvious reason. After much discussion among field personnel, most agreed it was just plain age. The forty year old rounds aren't what they used to be. The high dud rate was particularly disturbing for two reasons: number one, the excessive dud rate further reduced the number of useable rounds and number two, since there were now more unexploded duds, the increased chance of a hiker or other member of the public inadvertently denotating a dud and getting hurt or killed by the explosion.

The Forest Service, the ski areas and highway departments keep meticulous records of all duds and their locations and make every

effort to either destroy them or to have Army Emergency Ordnance Demolition teams destroy them. Unfortunately, most duds are in rugged, inaccessible areas which makes total recovery almost impossible; consequently, hikers and climbers often find them. The Forest Service and highway departments post signs at trail heads and other conspicuous places; the signs describe duds, warn people not to disturb them and list phone numbers to report a dud. While most people do not disturb duds and report them, others pick them up and move them. A man called the Salt Lake Ranger District a few years ago and described an object he had carried out of the mountains, had thrown into the trunk of his car and had been driving around with for two weeks that turned out to be a 75mm recoilless rifle dud; another guy carried a dud into the lobby of a hotel in Alta, put it on the reservation desk and asked what it was; Binx Sandahl, retired Forest Service and Utah Department of Transportation avalanche forecaster, found a 105mm recoilless rifle dud on his door step at Alta one morning that a hiker apparently left there. These sorts of stories illustrate how seemingly stable duds are, but the people that destroy them, treat them with kid gloves and make every effort not to disturb them. The stories also illustrate the potential for disaster and the need to develop ordnance that is virtually dud free and/or to develop an avalanche control system that does not use explosives.

Forest Service, ski industry, and British Columbia and state highway department avalanche control personnel met at a hastily called meeting in the spring of 1989 to discuss the dwindling ammunition supply and the expanding dud problem. The meeting was held in conjunction with the annual National Ski Area Association meeting in Anaheim, California. John Anderson distributed a comprehensive Army inventory of Army ammunition that showed a one to two year supply of serviceable ammunition available and a three to four year supply of unserviceable, but upgradeable ammunition available. This information seemed to confirm the rumors about diminishing supplies and all participants agreed that the time had come for action. The participants agreed on several courses including making a concerted effort to conserve military ammunition by shooting Avalaunchers more often and going on more hand routes; negotiating with the Army to allow test shooting of 106mm recoilless rifles at selected ski areas and highways; asking the Army to repair all unserviceable but upgradeable ammunition; seeking a federal appropriation to fund the 106 tests; inviting Canadian highway department and Parks Canada military weapons users to participate in all future meetings; and scheduling another, more comprehensive meeting of military weapons users.

Lieutenant Colonel Yost and her recent replacement, Lieutenant Colonel Steve Flohr, John Anderson and I arranged with the Army to allow test firing of 106mm recoilless rifles at Snowbird and Mammoth Ski Resorts. The two resorts fired about 100 rounds and had seven duds, not enough rounds fired to determine if the dud rate will be acceptable or not. Snowbird, Mammoth, Jackson Hole, Alpine Meadows and the Washington Department of Transportation will shoot 106mm recoilless rifles this winter (1990-91) which will hopefully provide

enough data to determine whether the 106 can be a viable weapon in the future.

A comprehensive meeting of military weapons users was held in Seattle this past spring. Over fifty participants representing nearly every user of military weapons attended the two day meeting. The meeting marked the first time in program history that such a wide spectrum of users had gathered to discuss common problems and share information. Many government and private industry representatives lead discussions including Colonel Flohr. Colonel Flohr provided the latest inventories which showed the Army would be completely out of point detonating 75mm and 105mm recoilless rifle ammunition by summer 1990; however, a small supply of unserviceable but upgradeable 105mm recoilless rifle ammunition and a much larger supply of both serviceable and unserviceable 106mm recoilless rifle ammunition is available. That meant, after this year, the only existing 75mm and 105mm recoilless rifle rounds are those the ski areas and highway departments have stored in their own bunkers. The supplies obviously vary according to entity, but most have a two to three years supply. The participants at the meeting agreed on several action items including establishing a small representative working committee to accomplish the other action items.

The Working Committee has met twice, in Alpine Meadows Ski Resort in June, 1990 and in Kalispell in October 1990. The Committee has made great progress in those two meetings toward solving many of the problems facing the military weapons program.

Committee members Marty Schmoker, Washington DOT; Terry Onslow, Alaska DOT; and Stuart Thompson, British Columbia DOT have started writing comprehensive standard training manuals. These manuals will cover all new weapons systems and will make training sessions consistent throughout the program. The Committee encouraged the Army to upgrade unserviceable but repairable 105 mm recoilless rifle ammunition which the Army has agreed to do. Those upgraded rounds will be very valuable in the interior while new avalanche control systems are developed and implemented.

The Committee will monitor the firing of 106mm HEPT military rounds by Snowbird, Alpine Meadows, Mammoth and Jackson Hole Ski Resorts and by the Washington State Department of Transportation during the 1990-91 season. As I mentioned earlier, there were seven duds out of 100 106mm HEPT rounds shot this past winter, which is too small a sample to determine if 106mm HEPT rounds will be acceptable for use or not. The sample should be around 1,000 rounds by the end of the winter, not only will there be more ski areas firing more rounds, but they will be firing into differing snowpacks. Because the 106 mm HEPT round is a base detonating anti-tank round designed to detonate when hitting a hard surface, it may work better in typically higher density snow packs in the Cascades and the Sierra than in typically lower density snowpacks in the Wasatch.

The Committee will also monitor the firing of the 105 Howitzer by the Alaska Department of Transportation on the Seward Highway and

along the Alaska Railroad this winter. The 105 Howitzer is a very accurate, reliable and durable weapon but it is more difficult to shoot and has a maximum seven-mile range. This maximum range, which could be devastating in an urban interface like Little Cottonwood Canyon where an overshoot could land in the suburbs of Salt Lake City, can be reduced by removing powder bags from the rounds. The capability to reduce the ammunition's range makes the 105 Howitzer a viable option in many instances.

Some very encouraging news occurred at the Committee Meeting in Kalispell. Representatives from Israeli Military Industries, an Israeli government owned arms manufacturer based in Maryland; SSE an English arms contractor based in New Jersey; and Prospex, Inc., a seismic engineering firm based in Colorado presented proposals for avalanche control devices.

Israeli Military Industries or IMI proposed manufacturing 106mm HE point detonating recoilless rifle rounds. The rounds would have more explosive punch than existing rounds and could be equipped with proximity fuses which would detonate the round one meter above the snowpack. The rounds would have thinner walls than U.S Military 106 rounds; the thin walls would essentially eliminate shrapnel and IMI would guarantee them to have less than a one percent dud rate. If the Army approves, the rounds could be shot through existing 106 Army surplus recoilless rifles and maybe through existing 105 Army surplus recoilless rifles. IMI requires \$200,000 to manufacture 50 rounds to be tested in IMI laboratories and on site at ski areas or above state highways this winter. If the tests are successful, the rounds would then cost between \$200-\$350 per round, depending upon number ordered. A coalition of state highway departments will take the lead to raise the necessary capital to fund the tests this winter.

SSE, Inc. proposed an existing airlauncher system called LOCAT which is manufactured by Ferranti International. The LOCAT would have a smaller explosive charge than a 105mm recoilless rifle but would have a proximity fuse which should then give the equivalent of a 105. SSE claims the LOCAT would have the same accuracy as a 105mm recoilless rifle and would not be affected by the wind, despite the fact it is propelled by gas and is fin stabilized. The British government has contracted with Ferranti to buy several LOCATS to use as training devices for heavy artillery. LOCAT shells would cost about \$110.00 per round with one pound of explosive and about \$200.00 per round with four pounds of explosive. LOCATS would cost between \$50,000 and \$150,000 each depending upon specifications. SSE estimates it would cost between \$50,000 and \$100,000 to test the LOCAT in the U.S. this winter. A coalition of ski areas will raise the money to fund the SSE.

Prospex Incorporated proposed using air guns, which are pressured air cylinders which create shock waves when the air is released from them, to trigger avalanches. These air guns would be mounted permanently in starting zones and would be connected to an air compressor or pressured tank, located in a safe area out of the

starting zone, to refill the air guns as needed. The air guns have worked well for seismic work but have not been tested for avalanche control. Prospex will probably test the devices in Washington State and maybe Utah and Colorado this winter.

The Committee has also approached the Federal Government about an appropriation to buy and upgrade U.S. Army surplus 105mm and 106mm recoilless rifle ammunition. The appropriation would buy the ammunition which would be sold on as as needed basis to ski areas and highway departments with all proceeds returned to the U.S. Treasury. Several western congressional delegates and senators have expressed interest in supporting the measure. The appropriation could probably only be used to purchase Army surplus and not to buy IMI or SSE products.

The future of the military weapons avalanche control program is uncertain but by no means bleak. Many options and combinations of options exist including Army issue 106mm recoilless rifle HEPT rounds and Army issue 105 Howitzer rounds; IMI 106mm recoilless rifle HE rounds; SSE LOCAT airlaunchers; and Prospex air guns. These may be used in combination with existing systems such as the Avalauncher and the Gax Ex propane explosive device. The only certain thing about the future of the military weapons program, is that it will be different and that it will considerably more expensive. Military surplus ammunition now cost between \$2.50 and \$20.00 per round; upgraded military ammunition will cost between \$40.00 and \$75.00 per round; 105 Howitzers will cost about \$90.00 per round; IMI rounds will cost between \$200.00 and \$350.00 per round depending upon volume; and SSE rounds will cost between \$110.00 and \$200.00 per round depending upon type. Which system or systems ultimately used will depend upon tests conducted this winter on Army issue 106mm HEPT rounds, Army issue 105mm Howitzer rounds, IMI 106mm HE rounds, SSE Airlaunchers, and Prospex air guns.

REFERENCES

Kalatowski, Marc, 1988, "The Avalanche History of Alta," The Avalanche Review, Vol. 7, No. 3, 1-9, December 1988.