

January 2013

It has come to my attention that a problem exists with certain projectile systems that utilize a partial bore Arming Disk. The problem is that the Arming Disk is being separated from the projectile and potentially prearming it inside the Breech and Barrel. It is my due diligence and moral obligation to my customers and the greater Avalauncher community to advise you not to use projectiles that use a partial bore Arming Disk until this problem has been completely resolved. To be clear, projectiles that use a full bore Pressure Plate are not involved with this problem. To date there have not been any predetonations due to this problem but the Arming System is not functioning as designed. I have included several documents from the foremost authorities on Avalaunchers to better explain what is occurring. [REDACTED]

[REDACTED] I have asked that Orica and CIL: "please prepare a comprehensive statement regarding the prearming and Barrel damage that is occurring with certain Arming Disk based projectiles by Tuesday afternoon at the latest- the sooner the better." I will forward their replies as I receive them. And, as a reminder, ALL Avalauncher users should be firing from behind a suitable Blast Shield- see our web site for pictures of such permanent and mobile shields. I ask that you refer any technical questions regarding this problem to your projectile distributors. Time is money for the Physicists/Engineers with whom Avalanche Mitigation Services worked with on this problem as I am sure you can understand. At this point I doubt that your explosive distributors are even aware of this problem. Please be patient with them as this problem is addressed. John Brennan, President, Avalanche Mitigation Services

1/18/13

John

Although your earlier enquiry regarding barrel wear marks focused on the axial signatures, as you know, I have been more concerned about the fine random circumferential scratch marks that could not be caused by the Fin vanes!! As I have been out of the loop for a while, today I contacted [REDACTED] to bring myself up to speed with current Avalauncher operations and ammunition, before preparing the response below.

As I thought initially, this investigation was likely to lead to a more serious issue regarding the integrity of the arming mechanism and this seems to be the case. I'm not sure how you intend to proceed but this matter clearly requires further investigation.

I have now reviewed the videos of "Stubby" rounds fired for CIL/Orion in December 2008 and unfortunately can confirm that the above signatures are indeed identical to those observed in [REDACTED] barrel. These firings indicated that the sub-caliber (50mm) Arming Plate was separating in the barrel and damaged my barrel for sure! Furthermore, review of this video data, indicates that all rounds were armed within 600mm of the muzzle (the vapor cloud obscured the first 600mm for my camera positions). For some of the firings, it is also possible to see the Arming Plate travelling at some 30 degrees off the shot line, with respect to the muzzle, indicating that they were tumbling randomly upon exit and clearly not guided/controlled by proper location on the Fin stem. It is likely that a reflected pressure pulse, described below, has pushed the Arming Plate backwards, probably in the breach area, resulting in a partially armed round.

It is not practicable to predict accurately if and where reflected pressure pulses will occur as gas rushes, in a particularly turbulent manner, into the breach area. This is further complicated by the possibility of valve hesitation and/or bounce existing for some valve/launcher designs. It is, however, a common characteristic of cold gas launcher systems, including those with more fundamental laboratory designs that use double diaphragm burst disks. Normally, these perturbations would pass without notice for a mechanically locked arming mechanism, but the simple slip-pin concept embodied in the PP Fin design (and similar modified variants), will be particularly vulnerable in this respect. The introduction of the sub-calibre arming plate has been the tipping point here.

It is possible that the subtle difference between the Body/Fin design of the Orica round has, by luck, avoided this problem, so extensive checks need to be made as different sub-caliber Arming Plate designs may not necessarily mark the barrel! I would suggest videoing the muzzle region simply to determine if the Arming Plate is in the correct position upon exit.

Clearly there is a considerable amount of detailed technical background that backs up the above but this is not the place or time to list it. After an initial review on your side, if the Avalauncher community feel I can contribute to a solution, I will do my best to help.

Regards
[REDACTED]

[REDACTED]
January 13, 2013

Mr. John Brennan
Avalanche Mitigation Services
31 Trainor's Landing
Aspen, Colorado 81611
USA

Re: Barrel scratches from sub-caliber arming disks

Dear John,

The sub-caliber arming disks are separated from the projectile in the breach. This hypothesis is based on:

- (1) The physics of fluid dynamics.
- (2) Pressure measurements obtained within the breach at 2000 Hz, which also yield projectile acceleration, speed and position within the breach or barrel at any instant.
- (3) Arming disk geometry, namely, sub-caliber diameter which permits the turbulent flow of N₂ at the moment of peak acceleration, when the projectile has been displaced about 20-30 mm in the direction of travel, to engulf all arming disk surfaces and the spring clip in a variable pressure field.
- (4) Damage characteristics within the barrel e.g. scratches, scratch geometry and scratch characteristics on the bore surface relative to the breach which indicate that the arming disk is acting as an independent projectile from the point of peak acceleration, or shortly thereafter, to the muzzle. Incidentally, there must be several individual projectiles in the barrel prior to exiting the muzzle, among them: (a) the explosive forebody with tail fin assembly (b) the arming disk and (c) the bore rider safety pin.
- (5) The concept that scratches on the surface of the bore would be absent if the arming disk remained attached to the projectile from breach to muzzle followed by decoupling of the arming disk when exposed to the airstream as designed. A scratch is easily discerned by touch as well as differentiated between a plastic smear due to transverse motion of the projectile in the bore. Regarding the former, aluminum is displaced on the surface of the bore by a harder material (the arming disk/spring clip/bore rider safety pin) which results in a scratch or gouge; whereas in the latter case plastic is smeared on the surface of the bore by a softer material (the forebody/tail fin assembly) which results in a raised surface feature. Again, scratches and smears are easily discernible with a finger and are the result of which material is harder than another.

In summary, evidence suggests that the sub-caliber arming disks are decoupled from the projectile where projectile acceleration attains a maximum value in the breach. Thus, the projectiles are "armed" prior to exiting the muzzle rather than in the air stream some distance downrange from the avalauncher.

Kind Regards, [REDACTED]

[REDACTED]
January 15, 2013

Mr. John Brennan
Avalanche Mitigation Services
31 Trainor's Landing
Aspen, CO 81611

Re: Safety Cross Pin

Dear John,

Let me explain your question regarding the safety cross pin and how it acts as an individual projectile in the barrel. I hypothesize that when the sub-caliber arming plate is decoupled in the breach, due to turbulent flow as mentioned in my previous communication, the head of the safety cross pin makes contact with the bore surface due to the force of the ejector spring. As the projectile accelerates from 0 to, say, 180 ms^{-1} over a distance of 4 m it also experiences violent transverse motion, or balloting. Thus as the projectile is slammed back and forth in random transverse directions it appears possible that a bending moment is induced on the safety cross pin. If the safety cross pin is bent to about 25° then the spring freely ejects the pin inside the barrel. I have attached two pictures showing: (1) the tail fin, I simply selected one that was on hand, and bent safety cross pin located in the muzzle and (2) the safety cross pin, bend angle is about 25° , and ejector spring. Note that the safety cross pin and spring slide freely over each other. Finally it is not difficult to extend this concept to a variety of tail fin designs.

Concerning your second question, scratches in the breach and barrel, the general physical principal is that an object made of a harder material will scratch an object made of a softer material. This is easily confirmed by rubbing the tail fin on the muzzle and taking note of which material is displaced. In this instance the harder aluminum has removed material from the softer plastic (see attached picture). Thus, the plastic forebody or the tail fin assemblies are not scratching the aluminum bore.

Finally, I have attached pictures of radial scratches at the muzzle and of gouge marks in the breach. The radial scratches at the muzzle are a result of an object that is harder than aluminum reflecting off the surface of the bore at high speed. In the breach material uncoupled from the projectile is making contact at the surface of the breach at or near the point of maximum acceleration where the turbulent flow of N_2 has engulfed the entire tail fin-arming disk-cross safety pin assembly. Remember, scratch damage shown here is a result of 30 projectiles.

Kind Regards, [REDACTED]



Orica Canada Inc.
Suite 140
109 Quarry Park Boulevard S.E.
Calgary, Alberta
T2C 5E7

January 23, 2013

Attn: All AVR 2 User's

AVR-2 AVALANCE CONTROL PROJECTILES RECALL

We would like to inform you that effective January 23rd 2013 Orica is issuing a product recall on the AVR-2 1.2 kg Avalanche Control projectiles. We will issue full credits for the returned product as well as organizing transportation for the recalled product at no cost to you.

I would like to stress that there has not been an incident with the product. However, we have been informed by industry users that there have been some instances of premature release of sub-caliber arming discs. This can lead to premature arming of the projectile while it is still in the barrel of the gun. We request that you stop using this product immediately and return the product to your Orica distribution site.

Orica takes safety very seriously, and we trust that you understand we would only take this action if we felt that a person or persons could be put at risk from a premature detonation.

If you have any questions or concerns please feel free to call me at (403) 809-2144 or email: marc.vasily@orica.com. We will have your local Orica Representative or Orica Distribution site contact you to coordinate the return.

Again we are sorry for the inconvenience,

A handwritten signature in dark ink, appearing to read "Marc Vasily", with a stylized flourish at the end.

Marc Vasily
Avalanche Control North America.



Div: EVANinc

Explosives
EXPERTS
Explosifs

533, Argenteuil
LACHUTE, Québec
Canada J8H 3Y2

Tel.: 450 566-0655
Fax: 450 566-0677
Web: www.cilexplosives.com

January 19, 2013

Safety Bulletin

TO ALL USERS OF C-I-L Explosives Snowlauncher slip-pin avalauncher systems.

C-I-L has always taken the position that we insist users of our snowlauncher products fire these from either a remote and protected area or that a ballistic guard be in place to protect the practitioner in the event of a mishap. Also C-I-L has engaged their technical staff and consultants to develop action as shown necessary.

Recent discussion and supposition on the safety of firing avalauncher units has led us to strongly reiterate our position on this point.

All users of our snowlauncher products must do so using a remote protected position or a ballistic guard.

If a user finds they cannot accommodate or will not accommodate such a practise, we would ask them to immediately stop using the C-I-L product and call C-I-L for immediate retrieval of any product in stock. This will be done of course at no cost to the customer.

Also if anyone needs help or advice to immediately address this situation, please call our technical consultant David Sly at 250-744-8765.

MANDATORY PROCEDURES POLICY for both SUB-CALIBER and FULL CALIBER pressure plates.

ALWAYS:

- Initiate your gun from a remote firing area at least 100 feet away from the gun in a straight line.
- OR
- From behind a protective ballistic shield, ground barrier, structure or snow mound
- Always ensure your crew is properly trained prior to the use of any C-I-L explosives products

NEVER:

- Stand beside your gun to fire
- Never combine any C-I-L snowlauncher system part with other manufacturer's system part
- Force any parts together

4-18-2019



Div: EVANinc

Explosives
EXPERTS
Explosifs

533, Argenteuil
LACHUTE, Québec
Canada J8H 3Y2

Tel.: 450 566-0655
Fax: 450 566-0677
Web: www.cilexplosives.com

**C-I-L Explosives is disappointed but determined in having to announce the suspension of commercial operations between C-I-L Explosives and Dave Sly's Maple Leaf Powder Co due to irreconcilable business disparities. This separation of business is effective immediately and any contact with C-I-L for purposes of Avalanche Control should be made from now on with Braden Schmidt, C-I-L's Technical Marketing Manager at :
Tel or Text 250 423 3302 or Email: braden.schmidt@cilexplosives.com**