Nammo Green Ammo

2012

May 16

Evolution

NT Green
SMALL ARMS AMMUNITION

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Nammo

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Agenda

- Green Ammo History
- Health Issues in Norway
- Green Ammo Mk2

Nammo

Mk1

Background, Nammo Green Ammunition

- Combat ammunition
- Full military performance
- Full temp. range performance
  -54°C to +52°C / -65°F to 126°F
- Punching Power

- Green ammunition
- Environmental friendly
- Safe working environment

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Focus on Eliminating Lead

- Dominating toxic substance
- High position on the "Environmental Black List"
- Well known health hazard
- Political issue
- High cost for waste removal
- Bonus effect: Elimination of Antimony and Barium

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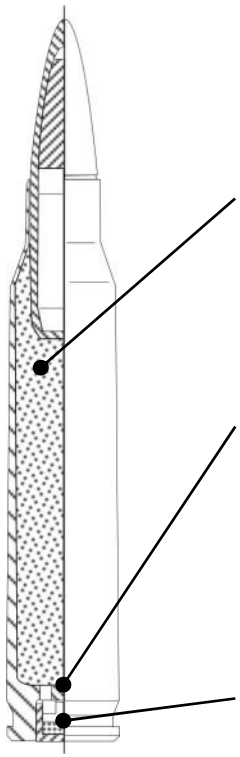
Nammo Green Ammunition Concept

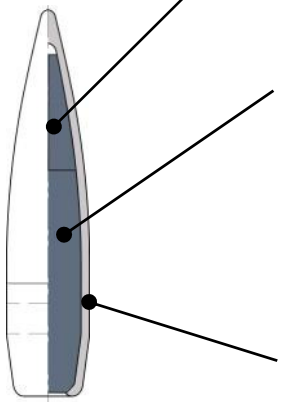
- 5.56 & 7.62 mm NATO
- Production in standard machinery



Powder
- Adapted for lead free primer and projectile

Ignition Chain
- Optimized for lead free system

Lead Free Primer



Hardened Steel Penetration
- Optimized for maximal penetration

Steel Core
- Optimized for reduced driving force, reduced barrel erosion and reduced copper fouling

Gilding Metal Jacket
- Optimized for reduced driving force, reduced barrel erosion, reduced copper fouling and to avoid projectile fragmentation

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History

Nammo Green Ammunition Program	
1995	Swedish requirement established by FMV
1996	Swedish specification established
1997 - 1999	Cartridge development
1999	First 5.56mm/7.62mm NT deliveries to Sweden
2000 - 2011	7 more green ball and tracer cartridges developed
2001	5.56mm/7.62mm NT adopted by Norway
2004	First NATO qualification approved
2012	More than 360 000 000 lead free cartridges produced and delivered

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NATO Qualification

Nammo Cartridge	Specification	NATO Qualification
5.56 mm Ball NT 4 HP	STANAG 4172	AC/225-128A (2004)
7.62 mm Ball NT 9 HP	STANAG 2310	AC/116-32A (2004)
7.62 mm Tracer NT 9	STANAG 2310	AC/116-37A (2005)
9 mm Ball NT 7 HP	STANAG 4090	AC/116-XVIA (2007)

Nammo still has the only NATO qualified lead free cartridges in caliber 5.56, 7.62 and 9 mm

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...So far

...1200 metric tons less lead polluting the environment and creating health hazards!

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- Health Issues in Norway

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Health Issues in Norway

- Reports of health issues in 2009.
- HK416 at indoor shooting ranges.
- Health issues
  - Irritated airways
  - Coughing
  - Fever
  - Cold sweats
  - Headache
  - Nausea
  - Body pain.
- 5.56 mm Ball Non Toxic
- Norwegian investigation showed increased levels of copper and zink when using lead free ammunition compared to traditional ”lead ammunition”.
- 15 + 100 million rounds fired in other weapon systems without any problems

Cause Analysis

Studies from FFI Norway, FOI Sweden and Nammo

- Metal particles, primary copper and zinc
- Carbon Monoxide, CO
- Ammonia, NH_3
- Hydrogen Cyanide, HCN

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Health Issues – "A System Problem"

Aspects			
Ammunition	**Weapon**	**Range Condition**	**Firing Procedure**
Powder	Dimensions (barrel etc.)	Indoor/Outdoor	Firing frequency
Primer	Weapon Cleaning	Ventilation	Pauses
Projectile	Firing rate	Distances between gunners	Distances between gunners
	Other design aspects	Weather conditions	Number of gunners

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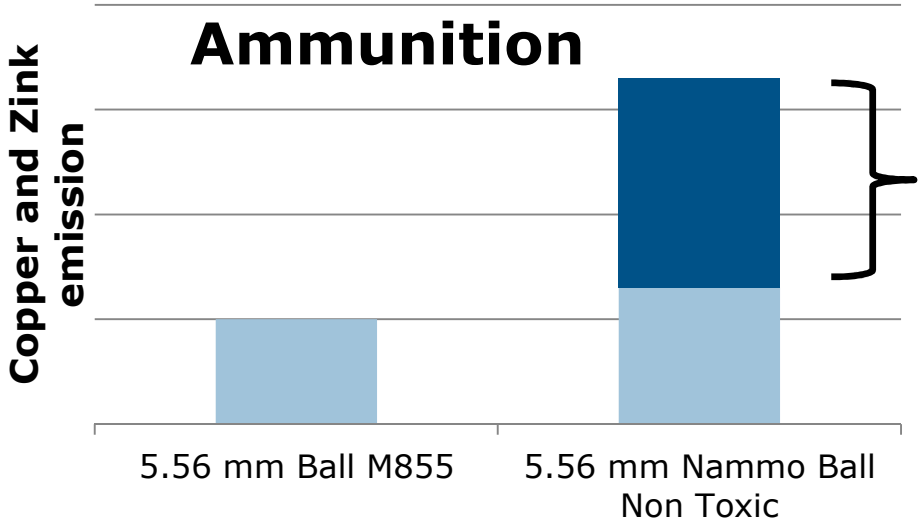
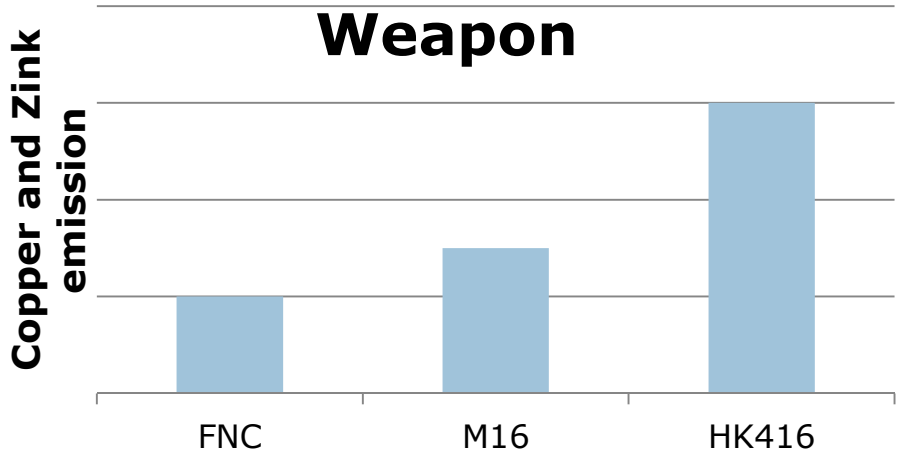
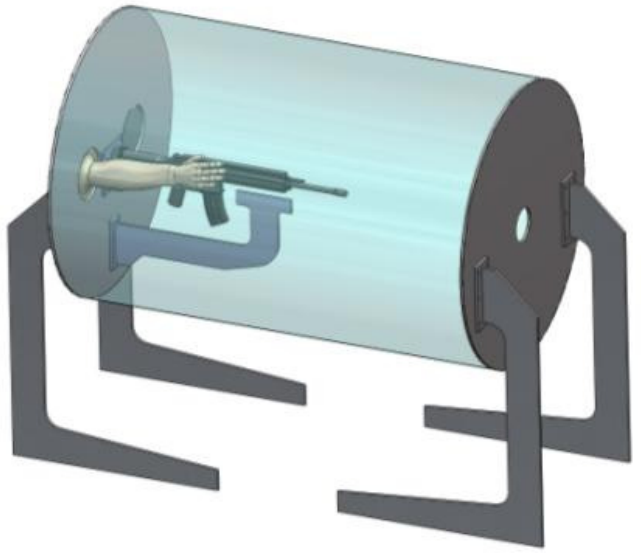
Emission Measurement



Depending on used weapon





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Cause Analysis – Copper/Zink Emissions

Ammunition

Lead → Barrel lubrication → ↘ Cu/Zn Emissions

Lead free → Barrel fouling → De-coppering agent → ↗ Cu/Zn Emissions

Weapon

Tight barrel HK416 ≈ 0.02 mm (0.0010”) → ↗ Cu/Zn Emissions

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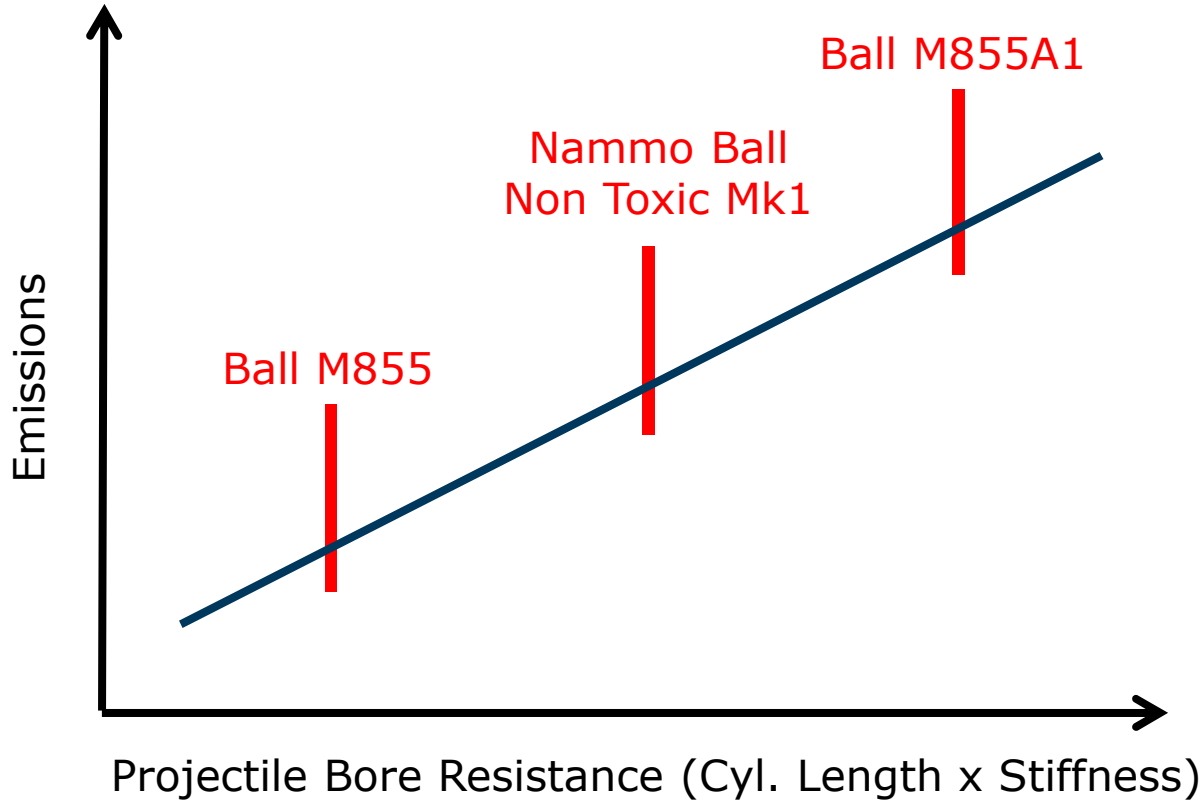
Cause Analysis – Weapon/Ammo System



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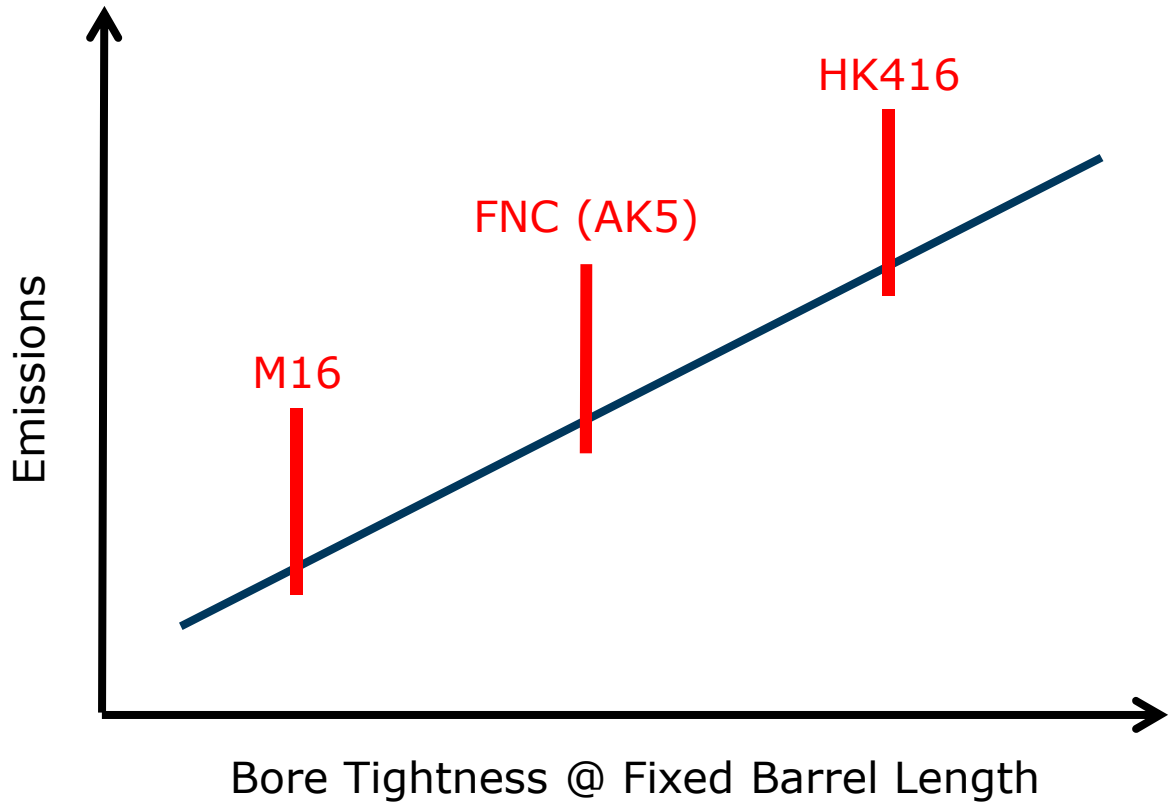

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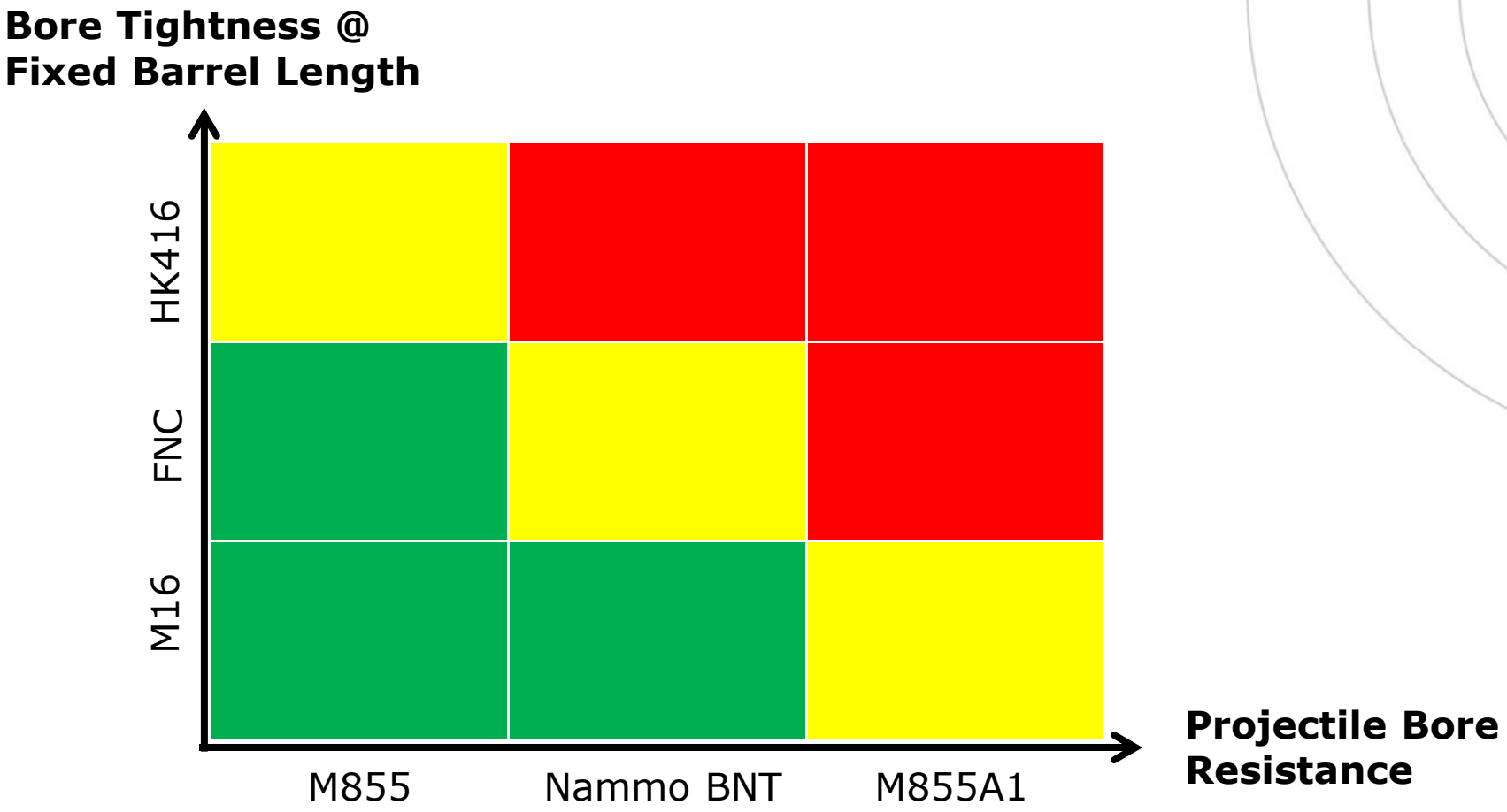

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- Green Ammo Mk2

Nammo

Mk2

Nammo 5.56 mm Ball NT 4 HP Mk2
Design Objectives

Same or better performance than Nammo Ball Non Toxic Mk1

- Accuracy
- Terminal ballistics
- Storage and Use Environments
  - -54°C to +52°C / -65°F to +126°F
- Function in all NATO specified weapons
- Barrel erosion
- Smoke, flash and fouling
- Full training and combat interchangeability

NATO STANAG and MOPI compatible

Reduced emissions to minimize health risks

- Copper- and Zink emissions not higher than from 5.56 mm M855
- Reduced gas emissions
  - Ammonia, NH_3
  - Hydrogen cyanide, HCN

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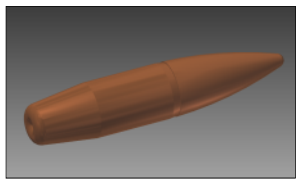
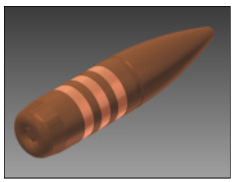
Evaluated Cartridge Designs

More than 40 cartridges in calibers 4.6, 5.56 and 7.62 mm were tested in 10 different weapons to map the emissions and to understand the relationship between causes

- 3 powder variants evaluated
  - Ball Powder
  - Extruded
- 4 different NT primers evaluated
  - Different compositions
- 9 different projectile variants designed, produced and evaluated
  - Ballistic performance and lethality
  - Producability
  - Emissions



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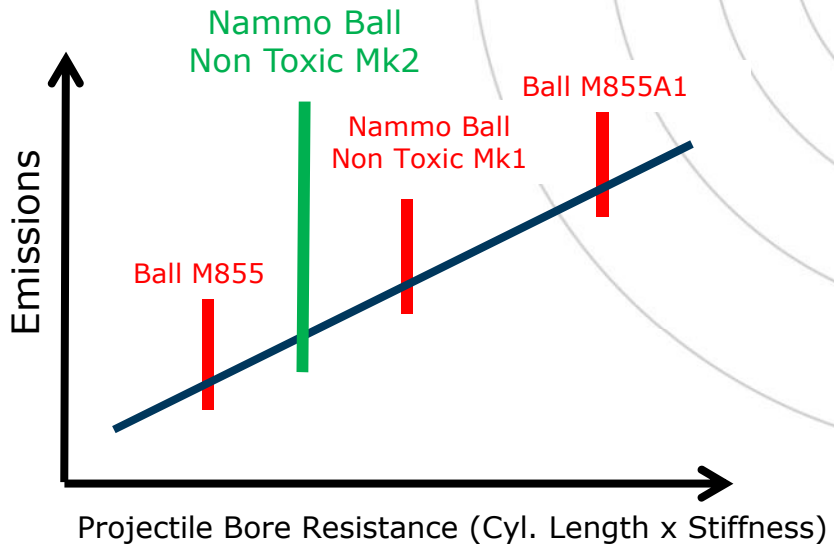
Emission Result
Nammo Cartridge 5.56 mm BNT 4 HP Mk2

Improved Powder

- Ammonia 50% less
- Hydrogen cyanide 75% less
- Copper 40% less

Improved Primer

- Zink 50% less



Improved Projectile Design

- Reduced cylindrical length / Reduced contact surface
- Copper 20% less

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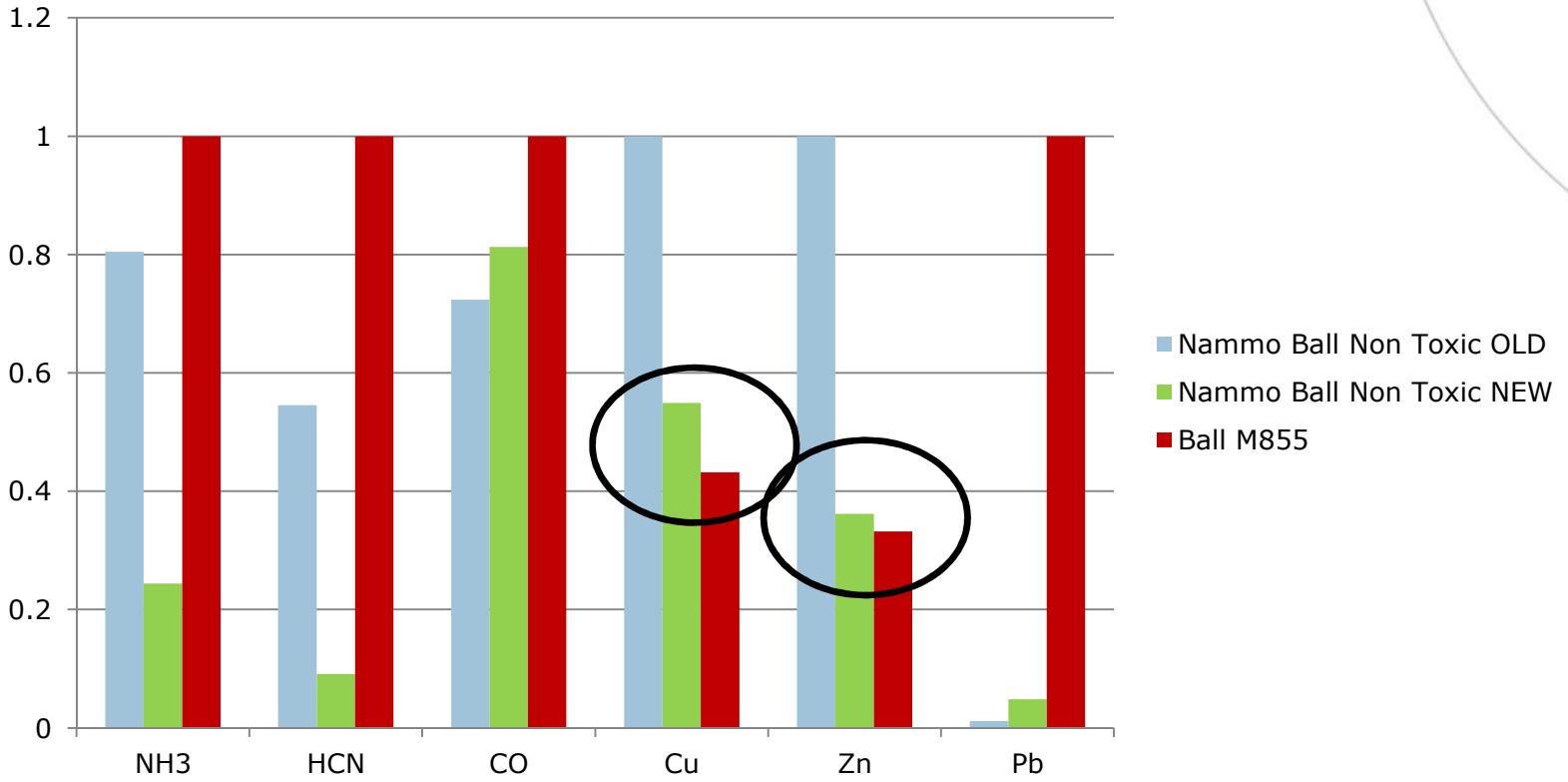
Emission Reduction Summary
5.56 mm BNT 4 HP Mk2

- Normalized values for comparison
- Gasses and airborne metal particles



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Improved Performance
5.56 mm Ball NT 4 HP Mk2

Fulfill all aspects in relevant STANAG and MOPI

Improved accuracy

- ≤ 2 MOA (Extreme spread ≤ 6 cm @ 100 m) shot from shoulder

Barrel erosion

- Fulfills NATO MOPI requirement
- Passed extended test in HK416 where 20 000 rounds were fired

Enhanced penetration capability

- Penetrates NATO 3.5 mm steel plate @ > 700 m

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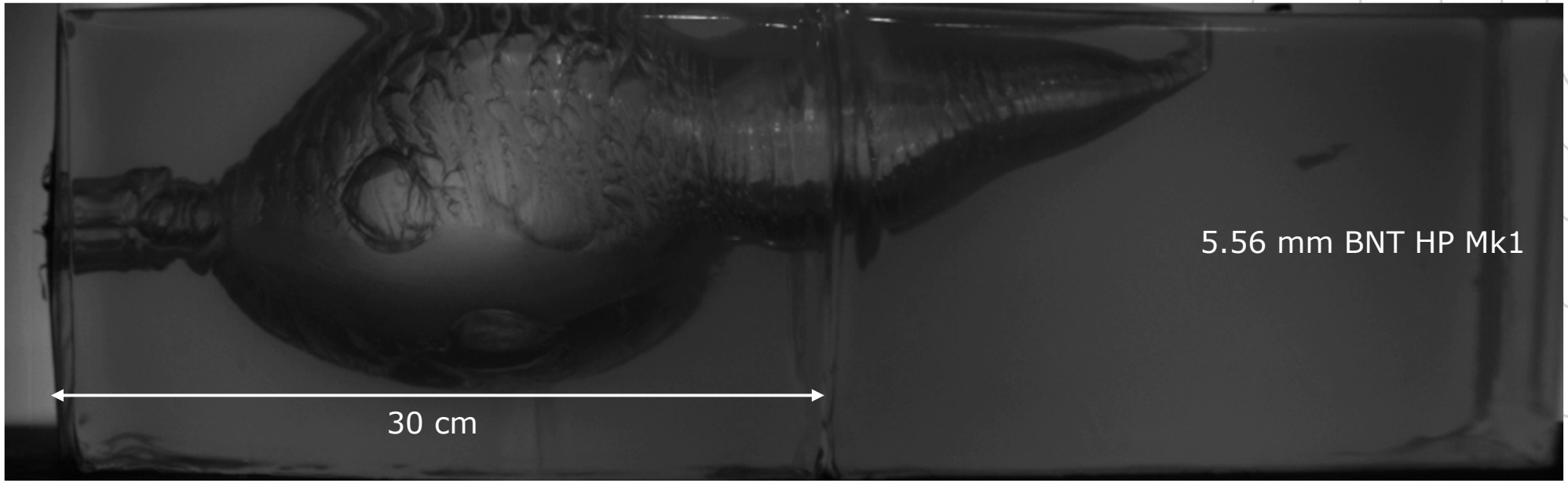
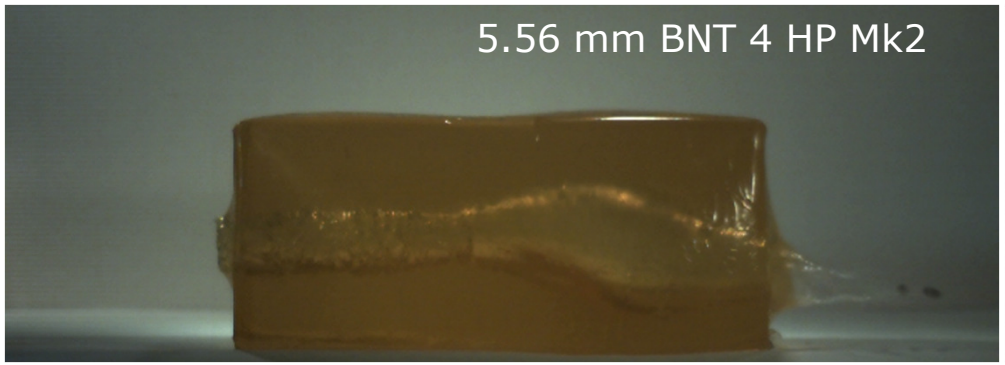
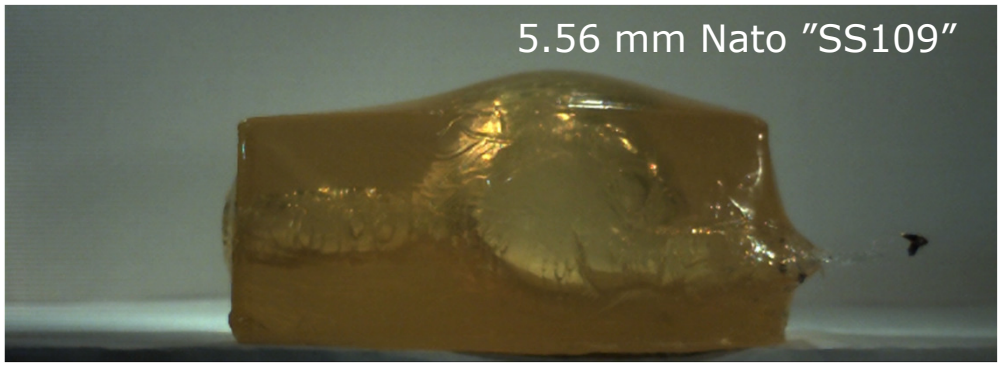
Improved Lethality







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Nammo Cartridge
5.56 mm BNT 4 HP Mk2

- Fulfills all expected requirements
- Still “Green”
- Minimizes impact on users’ health
- Improved ballistics and lethality
- More than 8 million rounds delivered

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Speaker information

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