U.S. Navy Small Arms Ammunition Advancements

Presented by:

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Harnessing the Power of Technology for the Warfighter

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited
7.62MM Special Ball, Long Range
MK 316 MOD 0
DODIC: AB39
NSN: 1305-01-567-6944
Shortfall

- Accuracy inconsistencies in the M118LR cartridge were identified
- Joint working group failed to correct deficiencies

Objective

- NSWC Crane tasked to develop a cartridge to better meet user requirements
  - Consistent lot to lot accuracy (Minute of Angle (MOA))
  - Function in new and existing gas operated sniper weapons

MK 11 MOD 2

MK 17 Sniper Support Rifle (prototype)
Objective (continued)

- Flash reduction

Specification Development

- Accuracy requirement based around 10 round shot groups
  - 7.0 in extreme spread max avg @ 600 yds (1st Production Lot)
  - 3.5 in extreme spread max avg @ 300 yds (after 1st Production Lot)
- Velocity standard deviation 15 fps maximum
  - A lower value equates to less vertical extreme spread at long range

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Specification Development (continued)

- Flash reduced and temperature stable propellant
  - Comparable performance -25 F to +165 F
- Each production lot consists of a single lot of projectiles, cases, propellant, and primers
  - Ensures consistency across lots

Solicitation for Contract

- Full and open competition
- Projectile open to weights of 150 to 200 grain
- Product bid samples tested for:
  - Accuracy, Pressure, Velocity, etc
7.62MM Special Ball, Long Range Development

• Desired performance requirements communicated:
  • Accuracy, accuracy, accuracy…
  • Function & casualty and muzzle flash requirements in both bolt action and semi-automatic rifles
  • Extreme temperature stability
  • Supersonic past 1,000 yards, etc.
• Federal Cartridge has over 25 years experience with Gold Medal brand of match ammunition
7.62MM Special Ball, Long Range Development

Cartridge Case:

- Developed a new, 7.62mm Match Cartridge case from our experience with 308 Win. Gold Medal match cartridge

Primer:

- Federal Cartridge Company’s Gold Medal Match Primer was selected

Projectile:

- Over 15 different projectile designs were tested
- Sierra MatchKing, 30 caliber – 175 grain projectile was selected

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Propellant

- Over 20 different existing propellants and new propellant blends were evaluated
- A modified extruded propellant was utilized

Manufacturing Process:

- Cartridge can be assembled on conventional high speed loading equipment
- Unique quality controls and test plan were established for manufacturing this cartridge

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7.62MM Special Ball, Long Range

Results

- Contract award to FCC
- 175 grain Sierra MatchKing® Projectile
- Propellant stable across operational temps
  - -25 F to +165 F
- Reduced flash propellant
- Performance consistency

MK 316 Flash Test

MK 316 New Production Lot Acceptance Results

<table>
<thead>
<tr>
<th>LOT #</th>
<th>600 Yard Accuracy (in)</th>
<th>300 Yard Accuracy (in)</th>
<th>Velocity Std Dev (fps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCC09A750-001</td>
<td>4.8</td>
<td>1.612</td>
<td>11</td>
</tr>
<tr>
<td>FCC09B750-002</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FCC09B750-006</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FCC09C750-007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FCC09C750-008</td>
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</tbody>
</table>

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited
.300 Winchester Magnum Match
Product Improvement (PIP)
MK 248 MOD 1
DODIC: AB43
NSN: 1305-01-568-7504
New Requirement

- The current 190 gr. .300 Win Mag cartridge, DODIC A191, has a published effective range of 1200 yds (1100 m).
- New requirement established a 1500 yds (1370 m) effective range.
- Initial tasking was to develop a 250 gr. .338 Lapua Magnum cartridge.

Objective

- Extend effective range from 1200 yds to 1500 yds (1370 m)
- Decrease the effect of wind drift on the projectile
- Flash reduced and temperature stable propellant -25 F to +165 F
.300 Win Mag PIP

RDT&E

- Research indicated that objectives could be met with .300 Win Mag

- Obtained prototypes
  - 210 gr. Sierra MatchKing® VLD .300 Win Mag
  - 220 gr. Sierra MatchKing® .300 Win Mag
  - 250 gr. Scenar .338 Lapua Mag
  - 250 gr. Sierra MatchKing® .338 Lapua Mag
  - 300 gr. Sierra MatchKing® .338 Lapua Mag

- Pressure, velocity, and 1000 yd accuracy testing conducted
RDT&E (continued)

Results

Accuracy

All rounds performed similarly with exception of the 300 gr. .338 Lapua Mag.

Velocity

Comparable velocity retention between 250 gr. .338 Lapua Mag and 210/220 gr. .300 Win Mag

<table>
<thead>
<tr>
<th>Mean Values</th>
<th>.300 Win Mag</th>
<th>.338 Lapua Mag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>190 gr. Sierra</td>
<td>210 gr. Sierra</td>
</tr>
<tr>
<td>Muzzle Velocity (fps)</td>
<td>2,936</td>
<td>2,864</td>
</tr>
<tr>
<td>Velocity @ 1000 yds (fps)</td>
<td>1,470</td>
<td>1,557</td>
</tr>
</tbody>
</table>

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.300 Win Mag PIP

Down Select

- 220 gr. Sierra MatchKing® .300 Win Mag
  - Meets objectives
  - Can be fired in existing weapons
  - Less sensitive than the 210 gr. VLD
  - Comparable accuracy and velocity retention to the 250 gr. .338 Lapua Mag
  - Significant cost savings over the .338 Lapua Mag

MK 13 MOD 5

Harnessing the Power of Technology for the Warfighter

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.300 Win Mag PIP

Results

- Increased effective range to 1,500 yds
- Reduced wind deflection
- Propellant stable across operational temps (-25 F to +165 F)
- Comparable accuracy to existing A191
- Contract estimated award of June 09
<table>
<thead>
<tr>
<th>Cartridge, Caliber 5.56mm Ball, Carbine, Barrier</th>
<th>Cartridge, Caliber 7.62mm Ball, Rifle, Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK 318 MOD 0</td>
<td>MK 319 MOD 0</td>
</tr>
<tr>
<td>DODIC: AB49</td>
<td>DODIC: AB50</td>
</tr>
<tr>
<td>NSN: 1305-01-573-2229</td>
<td>NSN: 1305-01-572-8492</td>
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</tbody>
</table>
5.56MM & 7.62MM Enhanced

AA53 MK 262 & MK 12 Special Purpose Rifle (SPR) Fielded late FY01 (Post 9/11)

Post 9/11 reports of ineffective ammunition (specifically M855 w/M4A1)

April 02 received funding for terminal study (M855, MK 262, M193, M995 and COTS 87 gr.).

Joint Service Wound Ballistics (JSWB) IPT 1\textsuperscript{st} meeting 28 April 03.
5.56MM & 7.62MM Enhanced (Continued)

- SCAR JORD included “Enhanced Ammunition”

- Enhanced ammunition program funded July 05

- Developmental contract awarded to ATK Sept. 06.

- Key performance characteristics derived from knowledge obtained from participation in JSWB IPT

- SOST developmental contract final report & proof of concept rounds delivered August 07.
Objective

- Develop ammo & weapon as a SYSTEM
- Incorporate lessons learned from JSWB IPT.

Performance

- Consistency; shot to shot & lot to lot.
- Accuracy, Combat - NTE 2 MOA.
- Intermediate barriers; auto glass/doors.
- Terminal, specifically CQC & behind barriers.
- Cost; as close to current rounds as possible.
Enhanced Cartridge Development

• Desired performance requirements communicated:
  • Behind barrier performance
  • Function & casualty and muzzle flash requirements in short barrel carbines
  • Extreme temperature stability
  • Accuracy, waterproof, cartridge configuration, etc.

• Federal Cartridge Company has over thirty years experience working with military and law enforcement customers on developing custom projectiles

• Testing begun with ATK and externally manufactured projectiles against performance requirements
**Enhanced Cartridge Development**

- New projectile developed from technology utilized in current law enforcement projectile
  - Front of bullet is designed to help defeat barrier
  - Back of bullet is solid copper and acts as a rear penetrator
- Short barrel propellant was specifically designed for this cartridge configuration
- Test results are positive
- Cartridge is compatible with various 5.56mm and 7.62mm firearms
- Projectile can be manufactured on conventional bullet assembly machinery and it can be assembled on high speed loading equipment
Accomplishments

✓ Consistency; shot to shot & lot to lot
✓ Accuracy, combat - NTE 2 MOA. (600 yds)
✓ Intermediate barriers; auto glass/doors.
✓ Terminal, Specifically CQC & behind barriers
✓ Cost: as close to M855 and M80 as possible.
<table>
<thead>
<tr>
<th>5.56MM &amp; 7.62MM Enhanced</th>
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<tbody>
<tr>
<td><strong>AB49, MK 318 MOD 0</strong></td>
</tr>
<tr>
<td><em>(5.56MM Enhanced)</em></td>
</tr>
<tr>
<td>62 grain OTM (reverse draw</td>
</tr>
<tr>
<td>jacket) bullet</td>
</tr>
<tr>
<td>Temp stable flash reduced</td>
</tr>
<tr>
<td>propellant</td>
</tr>
<tr>
<td>Not yaw dependant</td>
</tr>
<tr>
<td>Optimized for MK 16 (14”</td>
</tr>
<tr>
<td>BBL)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2925 fps @ 15’</td>
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5.56MM & 7.62MM Enhanced

Scheduled Availability

- 260K rounds 5.56MM, 750k rounds 7.62MM under a one year Limited Release to support MK 16/17 LRIP fielding
- Safety Testing for full type qualification in process. Completed by Sept. / Oct. 09
- Contract Award – Nov. 09 / May 10 (will know more by 5/8/09)
- Initial contract deliveries, full fielding capability – 1\textsuperscript{st}/2\textsuperscript{nd} Qtr 10.
Questions?

Also available at booth #620