WOUND BALLISTIC WORKSHOP

Host Agency: Butte Police Department
Date: May 27th, 2009

FEDERAL PREMIUM® LAW ENFORCEMENT AMMUNITION

speer™ LE

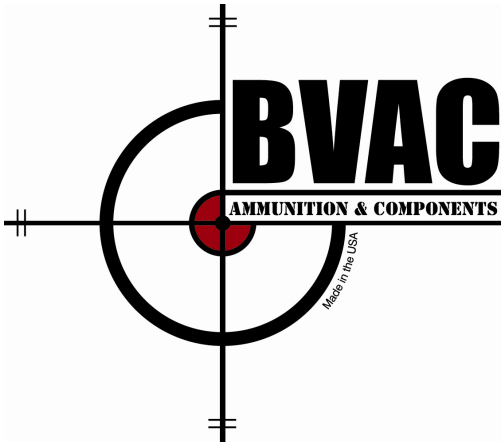
Hosted By:

Butte Police Department

Attending Agencies:

Butte Police Department
Montana Highway Patrol
Anaconda Police Department
Great Falls Police Department
Flathead County Sheriff's Office
Stevensville Police Department
Ravalli County Sheriff's Office
Hamilton Police Department
Missoula Police Department
Department of Criminal Investigations
Billings Police Department
Lake County Sheriff's Office
Cascade County Sheriff's Office

ATK Distributor Information



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Wound Ballistic Workshop Report

On May 27th, 2009 Butte Police Department hosted a Wound Ballistic Workshop at their training facility to evaluate performance duty ammunition. Invitations went out and the following agencies were present:

Butte Police Department
Montana Highway Patrol
Anaconda Police Department
Great Falls Police Department
Flathead County Sheriff's Dept.
Stevensville Police Dept.
Ravalli County Sheriff's Dept.
Hamilton Police Department
Missoula Police Department
Department of Criminal Inv.
Billings Police Department
Lake County Sheriff's Office
Cascade County Sheriff's Office

The workshop began in the classroom with a discussion of wound ballistic theory and history of ammunition selection. The discussion centered on the science that the agencies should be basing their ammunition selection on and why. After an approximate hour and a half classroom presentation on ballistics the class then moved to the range for hands on ballistic testing. When conducting a workshop often times firearms instructors, SWAT personnel, criminologists, rangemasters, lab technicians, and snipers are present which brings a vast array of application and knowledge to the table when evaluating ballistic performance

The workshop follows the FBI Wound Ballistic Testing Protocol. This test is specific to penetration, retained weight and expansion through multiple test events. These events are listed below by corresponding number:

#1 – Bare Gelatin @ 10 ft
#2 – Heavy Clothing @ 10 ft
#3 – Steel @ 10 ft
#4 – Wallboard @ 10 ft
#5 – Plywood @ 10 ft
#6 – Auto Glass @ 10 ft
#7 – Heavy Clothing @ 20 yd
#8 – Auto Glass @ 20 yd

The agencies then chose which rounds that they were going to shoot through which protocol. The agencies keyed on events #1 – Bare Gelatin, #2 – Heavy Clothing, #6 – Auto Glass, and #4 Wallboard. Demonstrated Calibers - .357 SIG, 40 S&W, 45 AUTO, and some .223.

****NOTE: ALL COMPETITORS AMMUNITION WAS SUPPLIED BY AGENCY NOT ATK PERSONNEL ****
**** THE PURPOSE OF THIS IS TO ENSURE THE INTEGRITY OF THE TEST ****

Please note that the shooting, measuring, weighing, and data entry is all done by the participants and not by ATK personnel. This is to allow participants a "hands on" and "unbiased" approach to ballistic testing.

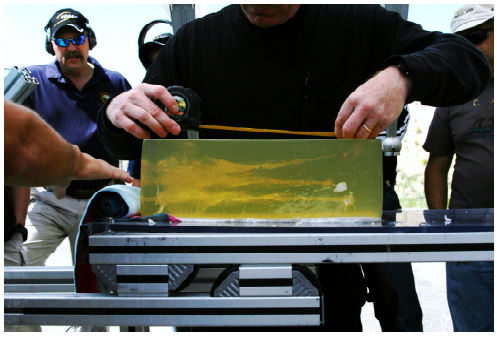
Test Event #1 – Bare Gelatin @ 10 Feet

The gelatin used for this test is 10% gelatin as called out in the FBI Protocol and was calibrated by temperature as well as BB penetration at a specified velocity.

Bullet	Caliber/Weight	Penetration	Expansion (in.)	Retained Weight
Speer GDHP	.357 SIG 125gr	**12.25"**	0.674"	100.08%
Winchester SXT	.357 SIG 125gr	**9.50"**	0.770"	104.08%

**Retained weight may exceed 100% due to test media being trapped in the bullet.*

As noted in the table above the Speer GDHP out penetrated and retained the same weight as the Winchester SXT. As learned in the classroom shot placement and penetration are the two most important factors in bullet performance.



Bullet	Caliber/Weight	Penetration	Expansion (in.)	Retained Weight
Federal HST	45 Auto 230 gr.	12.25"	0.900"	**101.00%**
Speer GDHP	45 Auto 230 gr.	**14.00"**	0.684"	100.39%
Winchester SXT	45 Auto 230 gr.	12.75"	0.924"	100.65%

**Retained weight may exceed 100% due to test media being trapped in the bullet.*

In the 45 Auto 230gr all bullets performed very well in penetration, expansion, and weight retention. The Speer Gold Dot out-penetrated the HST and SXT bullets by almost 1.25"-1.75". This is vitally important as the permanent wound cavity is reduced by this amount in the loss of penetration.

Test Event #2 – Heavy Clothing @ 10 Feet

The gelatin block is covered with four layers of clothing: One layer of cotton T-shirt (48 threads per inch); one layer of cotton shirt material (80 threads per inch); a 10 ounce down comforter in cambric shell cover (232 threads per inch); and one layer of 13 ounce cotton denim (50 threads per inch). This simulates typical cold weather wear. The block is shot at ten feet, measured from the muzzle to the front of the block.

Bullet	Caliber/Weight	Penetration	Expansion (in.)	Retained Weight
Speer GDHP	.357 SIG 125gr	**16.00"**	0.528"	99.76%
Winchester SXT	.357 SIG 125gr	10.75"	0.687"	102.56%

** Retained weight may exceed 100% due to test media being trapped in the bullet.*

As evident in the table above, Gold Dot penetrated 5.25" further than the SXT and had roughly the same expansion and weight retention. Penetration is the most important factor when evaluating bullet performance as the only permanent wound cavity being created by a handgun bullet is the actual path the bullet is traveling through in the target (i.e. tissue is only being stretched in the temporary wound cavity).

Test Event #6 – Auto Glass @ 10 Feet

One piece of A.S.I. ¼" laminated automobile safety glass measuring 15" X 18" is set at an angle of 45 degrees to the horizontal. The line of bore of the weapon is offset 15 degrees to the side, resulting in a compound angle of impact for the bullet upon the glass. The shot is made at ten feet, measured from the muzzle to the center of the glass pane. This test event with its two angles simulates a shot taken at the driver of a car from the left front quarter of the vehicle, and not directly in front of it.

Bullet	Caliber/Weight	Penetration	Expansion (in.)	Retained Weight
Federal HST	40 S&W 180 gr.	**14.25"**	**0.623"**	**92.78%**
Winchester SXT	40 S&W 180 gr.	10.25"	0.563"	**73.56%**
Speer GDHP	40 S&W 180 gr.	**12.25"**	**0.622"**	**85.17%**

***Core Jacket Separation ***

Core jacket separation is common when firing through auto glass, however both the Federal HST and Speer GDHP round did not shed its jacket and out-penetrated, out-expanded, and retained more weight than the SXT load. With further penetration and larger expansions the HST and Gold Dot are creating a larger permanent wound cavity than the SXT.

Bullet	Caliber/Weight	Penetration	Expansion (in.)	Retained Weight
Federal HST	45 Auto 230 gr.	**14.00"**	**0.609"**	**96.57%**
Winchester SXT	45 Auto 230 gr.	10.00"	0.606"	**79.70%**
Speer GDHP	45 Auto 230 gr.	**13.25"**	**0.638"**	**99.09%**

Core Jacket Separation

In the 45 Auto the Winchester SXT had core jacket separation and penetrated 3.25"-4.00" less than the Gold Dot and HST bullets. Both the Speer GDHP and Federal HST had larger expansions and retained almost 17-20% more weight than the SXT.

Overall, both the Speer Gold Dot and Federal HST had deeper penetrations, larger expansions, and retained their jackets when being shot through auto glass. In almost all events the Speer GDHP and Federal HST prevailed as the most terminally effective round of choice.

Wound Ballistic Workshop

Rep Initials: TW
Date of Workshop: 5/27/2009
Host Agency: Butte Police Department
Agency Contact: Cpt. Doug Conway
Agency Telephone: 406-497-1123
Range Contact: Cpt. Doug Conway

Recorder: Ty Windhorst
Statistician: Nic Painter
Shooter: Art Collins
Judge: Ed Guydas
Agencies Attending: BTPD,MTHWY, Anaco, GFPD, FC, STVPD, RACO,DCI
Agency Personnel: 24

Assistant: Darren Newsom

Type of Range: Outdoor
Chronograph: CED Millenium
Temperature: 75
Weather: Sunny
ATK Rep: Ty Windhorst
5 Shot BB Avg: 3.50

Shot #	Firearm	Test Event	Part Number	Lot Number	Ammo Mfg	Ammo Type	Caliber	Bullet Weight (Grains)	Velocity (Ft./Sec.)	Penetration (Inches)	Expand (Low)	Expand (High)	Expand (Avg)	Retained Weight (Grains)	Retained Weight (Percent)	Comments
1	SIG P229 4.40" barrel	1	SPE-54234		Speer	Gold Dot HP	357 SIG	125	1375	12.25	0.629	0.72	0.674	125.1	100.08%	
2	SIG P229 4.40" barrel	1	WIN-RA357SIG		Winchester	T-Series	357 SIG	125	0	9.5	0.72	0.819	0.770	130.1	104.08%	
3	Glock 22 4.49" barrel	1	FED-P40HST1		Federal	HST	40 S&W	180	1010	10.5	0.888	0.949	0.919	183.7	102.06%	
4	Glock 22 4.49" barrel	1	WIN-RA40T		Winchester	SXT	40 S&W	180	0	12.5	0.608	0.703	0.655	160	88.89%	
5	Glock 22 4.49" barrel	1	SPE-53962		Speer	Gold Dot HP	40 S&W	180	1025	11.5	0.674	0.754	0.714	182.6	101.44%	
6	Kimber 1911 4.5"	1	FED-P45HST1		Federal	HST	5 AUTO +	230	950	12.25	0.888	0.91	0.899	232.3	101.00%	
7	Kimber 1911 4.5"	1	WIN-RA45T		Winchester	SXT	45 AUTO	230	0	12.75	0.914	0.935	0.924	231.5	100.65%	
8	Kimber 1911 4.5"	1	SPE-53966		Speer	Gold Dot HP	45 AUTO	230	890	14	0.674	0.694	0.684	230.9	100.39%	
9	SIG P229 4.40" barrel	6	SPE-54234		Speer	Gold Dot HP	357 SIG	125	1375	13.25	0.359	0.463	0.411	97.6	78.08%	
10	SIG P229 4.40" barrel	6	WIN-RA357SIG		Winchester	T-Series	357 SIG	125	0	8.25	0.474	0.515	0.494	72.5	58.00%	Core Jacket Separation
11	Glock 22 4.49" barrel	6	FED-P40HST1		Federal	HST	40 S&W	180	1010	14.25	0.52	0.726	0.623	167	92.78%	
12	Glock 22 4.49" barrel	6	WIN-RA40T		Winchester	SXT	40 S&W	180	0	10.25	0.514	0.612	0.563	132.4	73.56%	Core Jacket Separation
13	Glock 22 4.49" barrel	6	SPE-53962		Speer	Gold Dot HP	40 S&W	180	1025	12.25	0.47	0.773	0.622	153.3	85.17%	
14	Kimber 1911 4.5"	6	FED-P45HST1		Federal	HST	5 AUTO +	230	950	14	0.517	0.701	0.609	222.1	96.57%	
15	Kimber 1911 4.5"	6	WIN-RA45T		Winchester	SXT	45 AUTO	230	0	10	0.57	0.642	0.606	183.3	79.70%	Core Jacket Separation
16	Kimber 1911 4.5"	6	SPE-53966		Speer	Gold Dot HP	45 AUTO	230	890	13.25	0.576	0.7	0.638	227.9	99.09%	
17	SIG P229 4.40" barrel	2	SPE-54234		Speer	Gold Dot HP	357 SIG	125	1375	16	0.515	0.541	0.528	124.7	99.76%	

#1	Bare Gelatin @ 10 Feet	#3	Steel @ 10 Feet	#5	Plywood @ 10 Feet	#7	Heavy Clothing @ 20 Yards	#9	IWBA 4 Layers of Denim
#2	Heavy Clothing @ 10 Feet	#4	Wallboard @ 10 Feet	#6	Auto Glass @ 10 Feet	#8	Auto Glass @ 20 Yards		

Wound Ballistic Workshop

Shot #	Firearm	Test Event	Part Number	Lot Number	Ammo Mfg	Ammo Type	Caliber	Bullet Weight (Grains)	Velocity (Ft./Sec.)	Penetration (Inches)	Expand (Low)	Expand (High)	Expand (Avg)	Retained Weight (Grains)	Retained Weight (Percent)	Comments
18	SIG P229 4.40" barrel	2	WIN-RA357SIG		Winchester	T-Series	357 SIG	125	0	10.75	0.642	0.731	0.687	128.2	102.56%	
19	Glock 22 4.49" barrel	2	FED-P40HST1		Federal	HST	40 S&W	180	1010	13	0.764	0.769	0.766	183.2	101.78%	
20	Glock 22 4.49" barrel	2	WIN-RA40T		Winchester	SXT	40 S&W	180	0	14.25	0.711	0.761	0.736	167.6	93.11%	
21	Glock 22 4.49" barrel	2	SPE-53962		Speer	Gold Dot HP	40 S&W	180	1025	12.25	0.631	0.681	0.656	179.9	99.94%	
22	Kimber 1911 4.5"	2	FED-P45HST1		Federal	HST	5 AUTO +	230	950	13	0.819	0.83	0.824	231.3	100.57%	
23	Kimber 1911 4.5"	2	WIN-RA45T		Winchester	SXT	45 AUTO	230	0	13.75	0.894	0.95	0.922	231.9	100.83%	
24	Kimber 1911 4.5"	2	SPE-53966		Speer	Gold Dot HP	45 AUTO	230	890	13.5	0.664	0.681	0.673	231.7	100.74%	
25	Glock 22 4.49" barrel	4	FED-P40HST1		Federal	HST	40 S&W	180	1010	11.75	0.766	0.771	0.768	181.3	100.72%	
26	Glock 22 4.49" barrel	4	WIN-RA40T		Winchester	SXT	40 S&W	180	0	11.75	0.727	0.758	0.743	180.6	100.33%	
27	Glock 22 4.49" barrel	4	SPE-53962		Speer	Gold Dot HP	40 S&W	180	1025	15	0.611	0.673	0.642	178.5	99.17%	
28	M4 16" 1:7"	1	FED-T223F		Federal	RU Nosler B	223	55	3220	10.875	0.223	0.232	0.227	10.1	18.36%	Fragmented base of bullet only
29	M4 16" 1:7"	1	HSM-55SP		unting Shac	SP	.223	55	0	9.5	0.385	0.551	0.468	24.2	44.00%	
30	M4 16" 1:7"	1	SPE-24448		Speer	GD Soft Poin	.223 cal	64	3000	17.5	0.415	0.525	0.470	49.3	77.03%	
31	M4 16" 1:7"	1	FED-LE223T3		Federal	Bonded SP	223	62	3050	14.5	0.463	0.493	0.478	62.9	101.45%	
32	M4 16" 1:7"	6	HSM-55VMAX		unting Shac	BT	.223	55	3220	7	0	0	0.000	0	0.00%	Fragmented Round non-recove
33	M4 16" 1:7"	6	FED-T223F		Federal	RU Nosler B	223	55	3220	8.25	0.248	0.263	0.256	10.2	18.55%	Disc only in block
34	M4 16" 1:7"	6	HSM-55VMAX		unting Shac	BT	.223	55	0	4.5	0	0	0.000	0	0.00%	Fragmented/non-measurable
35	M4 16" 1:7"	6	HSM-55SP		unting Shac	SP	.223	55	0	1	0	0	0.000	0	0.00%	Non-Measurable few fragment
36	M4 16" 1:7"	6	SPE-24448		Speer	GD Soft Poin	.223 cal	64	3000	10.125	0.443	0.487	0.465	28.5	44.53%	
37	M4 16" 1:7"	6	FED-LE223T3		Federal	Bonded SP	223	62	3050	14	0.304	0.374	0.339	30.5	49.19%	

#1	Bare Gelatin @ 10 Feet	#3	Steel @ 10 Feet	#5	Plywood @ 10 Feet	#7	Heavy Clothing @ 20 Yards	#9	IWBA 4 Layers of Denim
#2	Heavy Clothing @ 10 Feet	#4	Wallboard @ 10 Feet	#6	Auto Glass @ 10 Feet	#8	Auto Glass @ 20 Yards		