Body Armor Use, Care, and Performance in Real World Conditions: Findings from a National Survey*

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EXECUTIVE SUMMARY

This report describes research conducted by the Police Executive Research Forum (PERF) for the National Institute of Justice (NIJ) regarding law enforcement officers' use of body armor, often referred to as bullet-resistant vests; and state and local law enforcement agencies' policies on the use of body armor. This study also included limited, exploratory research on the performance characteristics of body armor that has been used in the field for five years, in comparison to new body armor.

The current research builds on previous work conducted by PERF in conjunction with U.S. Department of Justice regarding body armor. In 2005, PERF and the Bureau of Justice Assistance (BJA) surveyed the nation's 100 largest law enforcement agencies regarding their use of body armor containing Zylon® following reports that Zylon®-based armor was vulnerable to performance degradation. (That study revealed that more than one-third of the agencies were still using armor containing Zylon® yarns, but nearly all of those agencies were planning to replace those vests.)

And in 2009, PERF and BJA completed the first nationally representative survey of law enforcement agencies on body armor policies and practices. This survey revealed that 99 percent of responding agencies used body armor to some extent, but only 59 percent of agencies *required* use of body armor at least some of the time, and less than half of the agencies that mandated that body armor be worn had a written policy on this issue, making enforcement of the policy more complex.

Because it appeared in 2009 that formal policies on body armor in law enforcement agencies were lagging behind the actual use of body armor by officers, PERF and NIJ agreed that the current body armor study should be conducted from the perspective of individual *officers*, not agencies. In this way, we could produce findings about the cutting edge of body armor practices (actual use and officers' attitudes about body armor), not merely the lagging indicators (written policies).

Specifically, the major element of this study is a survey of a national sample of sworn officers from randomly selected agencies, weighted to reflect a representative sample of agency sizes, agency types (police departments, sheriffs' departments, and state police departments), and regions of the country. The survey was conducted from October 2010 to May 2011.

Following are the major findings, policy implications, and recommendations from this study:

1. Use of Armor: Policies requiring use of body armor appear to be increasingly prevalent. Large majorities of officers report that they obey those policies. And a key factor in high compliance rates appears to be the fact that large majorities of officers understand that armor is vital to their safety.

As mentioned above, the survey conducted for this project is not directly comparable to the PERF/BJA survey of 2009, because it was designed to be a representative sample of law enforcement *officers*, as opposed to the 2009 survey of law enforcement *agencies*. However, the new survey does appear to offer strong evidence that "mandatory-wear" policies are becoming more prevalent.

Specifically, the new survey of more than 1,000 officers from all ranks, chosen to reflect a nationally representative sample of municipal, county, and state agencies, found that more than 92 percent of officers reported that they are required to wear body armor, either "at all times when on duty" (57%) or "at most times when on duty" (35.3%).

By contrast, the survey completed in 2009 found that only 59 percent of the responding agencies required their officers to wear body armor at least some of the time they were on duty.

Similarly, the new survey found that 77.9 percent of officers reported that their agency has a written body armor policy. By contrast, the 2009 survey found that only 45 percent of the responding agencies indicated that they had a written policy requiring their officers to wear body armor.

These findings, showing increases in "mandatory wear" requirements and in written policies, are perhaps the most significant information obtained through the new survey, because requiring officers to wear body armor has direct implications for officers' safety. As it happened, the PERF survey described in this report was conducted shortly after Attorney General Eric Holder announced that the Justice Department's Bureau of Justice Assistance (BJA) would begin requiring jurisdictions to have a written "mandatory wear" policy in effect if they wished to obtain federal funding for body armor through BJA's Bulletproof Vest Partnership (BVP) program.[1] The Justice

[1] The Attorney General first announced the new requirements, which applied to FY 2011 BVP grants, in October 2010. Details are available at http://www.ojp.usdoj.gov/bvpbasi/docs/FAQsBVPMandatoryWearPolicy.pdf and

Department cited an increase in officer deaths in firearms-related incidents in adopting this new requirement.

It is encouraging to note that fatal shootings of officers declined sharply in 2012.[2] According to the National Law Enforcement Officers Memorial Fund (NLEOMF), which keeps detailed statistics on officers who are killed in the line of duty, there were 49 fatal shootings of officers in 2009, 59 fatal shootings in 2010, and 70 fatal shootings in 2011.[3] But as of October 30, 2012, there were 36 fatal shootings in 2012, which is a 37-percent decrease compared to the 57 fatal shootings for the same January 1-October 30 period in 2011.[4]

Because the new (2011) survey focused on individual officers, it also produced data on officers' compliance with, and attitudes about, body armor policies. These findings were encouraging: nearly all officers reported that they wear body armor when required to do so, obeying the policies either all of the time (87.9%) or most of the time (11.4%).

And even though 73 percent of responding officers said they had never been shot at or involved in other situations in which their body armor protected them from possible injuries, officers overwhelmingly understand the need to wear body armor; 90 percent said that one reason they wear body armor is that it is "critical for safety." In addition, 49.2 percent of responding officers identified "agency policy

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http://www.ojp.usdoj.gov/bvpbasi/. PERF began sending the survey to respondents in October 2010, and data collection continued until May 2011.

[2] Whether the BVP's "mandatory wear" requirement is a causal factor in the reduction in officer deaths warrants further inquiry.

[3] http://www.nleomf.org/facts/officer-fatalities-data/causes.html

[4] http://www.nleomf.org/facts/officer-fatalities-data/

requires it" as a reason why they wear body armor, and 14.3 percent cited "family pressure" as a factor in their decision to wear the protective gear.

Policy Implications and Recommendations: The survey revealed that large majorities of officers work at agencies that require use of body armor, and that approximately half of the officers cite those policies as a reason for wearing armor. That suggests that the policies are effective and should be maintained by agencies that have them, strengthened in agencies that currently have weak policies, and considered by agencies that lack them. It should be noted that 22.1 percent of officers reported that their agency does not have a *written* body armor policy, which may hamper managers' enforcement efforts.

The finding that 90 percent of officers said they wear armor because they believe it to be critical to their safety is significant. In addition to ensuring that body armor policies are strong, police agency executives should make a priority of maintaining this high rate of understanding through educational and training initiatives. If officers believe that their safety depends on wearing body armor, they may be more likely to wear it regardless of whether their use of armor is being monitored in a given situation.

Officers were asked about enforcement actions in their agencies regarding body armor policies. Fewer than one percent of officers reported that they had ever received discipline for a body armor violation, so most had to speculate about enforcement or base their responses on knowledge of other officers who were disciplined. Most officers (58.3%) said they believed that the consequence for a first offense in failing to wear body armor would be a verbal reprimand, and the

consequence of a second offense would be a written reprimand. Only 20.3 percent said that they believed that a second offense would result in a suspension.

Despite the fact that officers did not believe that failing to wear body armor, even repeatedly, would result in particularly severe forms of discipline, when officers were asked to estimate how many of the officers on their shift or standard duty assignment adhere to body armor policy, more than two-thirds (68.7%) said they believe compliance to be 100 percent, followed by another 27.9 percent who estimated compliance at 76 to 99 percent. Again, it appears that to a very large extent, officers have self-discipline about wearing their body armor, perhaps because they have the high level of understanding that it is in their own interest to protect their safety.

It should be noted that when officers were asked which features they would like to see in the next generation of body armor, the most common response was "improved comfort" (84.8%), followed by "improved fit" (72.6%) and "reduced weight" (63.9%). This suggests that for most officers, the most significant obstacle to regular use of body armor is that it can be bulky, heavy, and uncomfortable to wear. This finding should be considered when police agencies are choosing among various brands and types of body armor to purchase for officers. When different brands of armor offer comparable levels of protection, it may be advisable to involve officers to a significant extent in making judgments about which armor is most comfortable.

2. <u>Maintenance and Care: Most officers appear to be knowledgeable about many body armor care and maintenance practices. However, significant numbers of officers do not understand certain aspects of recommended procedures. Furthermore, officers do not always adhere to recommended practices even when they do understand them.</u>

The survey included a series of true-false questions designed to test officers' knowledge of facts pertaining to body armor design and maintenance procedures. The survey revealed that large majorities of officers—between 89 percent and 99 percent—understand that body armor is not designed to last indefinitely, that it cannot be relied upon to stop rifle bullets[5], that it should be replaced if it is penetrated by a bullet, that it should not be laundered with standard detergent in a washing machine, and that it should not be stored in the trunk of a car. Nearly two-thirds of officers did not know that moisture can reduce the ballistic protection of body armor.

Furthermore, the survey revealed that a substantial number of officers may not be caring for and maintaining their armor in the optimal manner, as recommended by many manufacturers. For example, 57.1 percent of officers reported that their most common method of storing their armor was to hang it on a regular clothes hanger, despite the fact that this is often not the optimal method for body armor storage recommended by the manufacturer. Although the specific

[5] It is possible that a respondent's perception of whether or not their armor is designed to stop rifle bullets could vary by their own body armor protection level. For increased precision, the research team performed crosstab analyses of respondent armor level by perception that his or her "body armor can stop rifle bullets." The majority of respondents, as mentioned in the full technical report, understood that their armor could not stop rifle bullets irrespective of level. Further, no one with the highest body armor levels reported a belief that their body armor could stop rifle bullets. All of those who reported this perception used Level IIIA or lower – which do not have this capacity.

impacts of using a regular hanger for storage have not been measured, some manufacturers warn that improper hanging of vests can wear out the straps that come down on enclosures, allowing the ballistic material to move around during the lifetime of the vest, and possibly leaving certain areas of the body at risk. For this reason, many manufacturers and department policies suggest laying the armor flat for storage and/or use of specially designed hangers that can hold the weight of the armor.[6]

Policy Implications and Recommendations: These findings point to a need for further training and education of officers regarding certain points of body armor maintenance and care. On the question of hanging body armor on standard clothes hangers, this less optimal method of storage was found more often in urban law enforcement agencies. (When asked *where* they stored their armor while it is not in use, 55.9 percent of respondents said they kept their vests in their locker.)

Thus, police executives should not only instruct officers about the potential benefits of storing body armor flat, but also should ensure that the departments' physical facilities have the capacity to allow for this storage

[6] Several manufacturer websites indicated that storage on a standard clothes hanger was not the optimal method of storage. For example:

http://www.safariland.com/bodyarmor/BodyArmorCare.aspx
http://www.marsec4.com/2010/03/practical-and-affordable-body-armor-storage-option/
http://military-body-armor.blogspot.com/2011/12/how-to-retain-ballistic-performance-of.html

Further, PERF conducted a brief survey of 10 leading body armor manufacturers. This survey revealed that seven of the 10 manufacturers indicated that body armor optimally should be stored lying flat. For example, the St. Louis PD policy states,"Care should be taken to store body armor flat, either on a shelf or other flat surface. When this is not practical, suspended on a clothes hanger is the next best method. Body armor should never be folded or stood on its edge. This improper storage will create "wrinkles" in the body armor and may cause curling at the edges." Similarly, the Montgomery County MD PD explicitly states, "Never hang the body armor on a coat hanger. Always lay the vest flat when not wearing."

method. New configurations of lockers or other storage facilities may be required. It is suggested that law enforcement executives contact their individual body armor manufacturers to determine the optimal method of storage, since this could vary (e.g., one body armor manufacturer stated that it is best to store armor on a specially designed hanger).

Additionally, 51 percent of officers stated that body armor is not available for immediate replacement, should theirs be damaged or lost. This finding suggests a need for departments to maintain a limited inventory of body armor in various sizes, rather than requiring officers to wait for long periods of time without armor. Departments may also examine developing alternative or back-up plans with manufacturers to speed up replacement time or have temporary vests available during the order processing time.

3. Ballistics testing of vests used in the field suggests some loss of armor performance over time, under one method of measurement.

In addition to conducting the survey of law enforcement officers regarding their use of body armor, PERF conducted limited exploratory work to evaluate the possible effects of environmental factors and officer care and maintenance patterns on the performance degradation of their vests. In order to assess overall degradation to body armor, while taking into consideration factors such as body armor age, ambient climate, trauma to the armor, and its maintenance, PERF obtained a sample of 30 used vests from officers working in four parts of the country with different climate zones, and an additional 15 new vests for

comparison. All of the used vests were between four and five years old with sufficient field "experience." The vests were all protection level II or IIIA, designed for male officers, and either woven aramid or hybrid fiber design. Performance quality was measured by assessing armor degradation following a series of ballistic experiments including V-50 testing (an industry standard ballistic test for body armor that identifies the velocity at which 50 percent of bullets penetrate the armor, and 50 percent are stopped by the armor) and backface deformation[7] measures. Ballistic Performance Parameters were also calculated, using measures such as ultimate tensile strength, elasticity, density, and strain of the fibers. These tests results were compared with the humidity levels in the region the vests came from, as well as with officers' recollections (through focused interviews with the officers) of situations they experienced with the armor, and their general care and maintenance practices.

Ballistics testing identified a reduction in V-50 performance of the used Level II and IIIA body armor of approximately 10 percent, when compared to new armor. This reduction did not differ by region. Backface deformation and fiber testing did not reveal significant differences between the used and unused vests. The noted differences between the old and new armor might be attributable to varying officer experiences, as well as body armor care and maintenance habits. Given the fact that, by necessity[8] the research design had to rely on the use of vest comparisons of

[7] Backface deformation refers to the depth of depression of rounds that partially penetrate the armor.

[8] New vests of the same make and model were unavailable. The manufacturers that were contacted were unwilling (due to ordering such a small number) and/or unable (some of the materials utilized to make the 04 vests were no longer in production) to do so. Faced with this reality, the research team, including federal representatives and body armor experts, made the decision to make

different makes and models, the reader should be cautioned against generalizing from the finding; the apparent reduction in V50 seen in the current ballistic tests between new and used armor may only be a result of the model-to-model variations seen within each armor level. **While the current sample size was sufficient for identifying broad trends, it was limited in its ability to detect subtle relationships that a larger study could explore.**

Next Steps

This study demonstrates that much progress has been made in the last decade in terms of law enforcement agencies providing body armor to officers, developing policies to require that officers use the armor, and educating officers about why they need body armor to protect themselves, and about how to care for and maintain their body armor.

This study identified several areas for improvement in officers' understanding of and adherence to proper body armor care and maintenance procedures. Law enforcement agencies should consider the implications of these findings and adopt appropriate measures.

Finally, this study provided preliminary ballistics research indicating that body armor, as it is used in the field, may degrade somewhat over time, although additional, more robust research is necessary to verify this due to the small sample size and inability to acquire identical comparison armor. Additional work is also needed to produce strong guidance to police executives about the potential loss of

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comparisons between the available vests. This, of course, impacts research precision, and hence, the need for caution in interpreting the results.

body armor effectiveness, and about how frequently agencies should routinely replace body armor. Lives may depend on accurate data defining an appropriate "shelf life" for body armor.

This additional research should be conducted prospectively, to allow for real-time collection of data about environmental and experiential factors that may impact the strength of body armor, rather than officers' recall of such factors at a later date.

INTRODUCTION

Police officer fatalities due to shootings rose 20 percent between 2009 and 2010, from 49 to 59, and in January 2011, the nation reeled when 11 officers were shot in one 24-hour period (National Law Enforcement Memorial Fund, "Law Enforcement Fatalities" 2011). By March, the continued rise of firearms-related police fatalities led Attorney General Eric Holder to call a meeting of police chiefs from across the country for guidance (McKelway, 2011), and the Department of Justice mandated that all 13,000 jurisdictions participating in the federal Bulletproof Vest Partnership (BVP) institute mandatory wear policies.

Many factors have been cited as possibly contributing to spikes in shootings of police officers, such as the declining economy, increasing contacts with emotionally disturbed offenders, and the prevalence of drug use among offenders. Some police officials have spoken of a perception that youths are increasingly willing to shoot at police, and more specifically, to target the heads and necks of officers rather than their more protected torsos. Between 2002 and 2011, shootings caused 37 percent of all officer deaths, followed by auto accidents (30%), and job-related illnesses (11%) (National Law Enforcement Officers Memorial Fund, 2011 Final).

Body armor is considered one of the most important safety devices available to protect officers against criminals' intent to harm them (National Law Enforcement Officers Memorial Fund, "Preliminary" 2011). Body armor is principally designed to protect wearers from the impact of bullets fired from handguns or long guns, or the shrapnel fragments resulting from explosions. When

combined with tightly woven fiber layers, laminated materials, or metallic elements, it also can provide some level of protection to the wearer from knife attacks and other forms of injuries (e.g. blunt trauma from traffic accidents).

One of the first documented cases of body armor being demonstrated for law enforcement use occurred in April 1931 when it was presented to the Washington, D.C. Metropolitan Police Department.[9] Since that time, body armor has evolved to meet the safety needs of military and law enforcement personnel. This has led to the development of lightweight armor that can protect against handgun assaults, while still being comfortable enough (in terms of weight, flexibility, and temperature) to be worn by the average officer conducting his or her daily details on the street. Body armor has been widely available and used by law enforcement officers over the last 30 years, saving an estimated 3,000 lives in shooting incidents and blunt force trauma situations (DuPont/International Association of Chiefs of Police/DuPont Kevlar Survivor's Club, 2011). Moreover, a recent study by the RAND Corporation (LaTouerrette, 2010) found that an average of 8.5 lives would be saved each year if all police were equipped with body armor, based on a finding that armor more than triples an officer's chances of surviving a shooting to the torso.[10]

Few would challenge the critical benefits of body armor for officer safety. As will be discussed in the current study's results, today a significant majority of departments nationally require that that their police officers wear body armor at all times or at most times when officers are on duty. This represents a major change

[9] Described in the April 2, 1931 edition of the Washington DC *Evening Star*.
[10] Other studies have indicated that officers not wearing body armor are 14 times more likely to suffer a fatal injury than their "suited up" counterparts (Tompkins, 2006).

from the 2009 BJA-PERF Body Armor Study, which found that 59 percent of agencies require their officers to wear body armor when on duty (although many officers chose to wear armor anyway).

However, this same study showed limitations in the degree to which agencies ensured the proper care and maintenance of the armor worn by their force. This is true even though significant data and practical experience have demonstrated the potential for environmental and other maintenance factors to degrade body armor performance in the field.

Despite its widespread use and recognized importance, to date, no rigorous studies have examined the relationship between officer care and maintenance behaviors (storage, fitting, frequency of wear, etc.), environmental factors (e.g. regional variance in humidity and temperature), and the degradation of body armor's ability to protect against bullet penetration or blunt force trauma (backface deformation[11]).

This study marks the first exploratory study of this nature. First, replicating the methodology utilized by Weisburd et al. (2001) to study a nationally representative sample of police officers on use of force[12], the current study surveys a random selection of more than 1,000 individual officers nationally[13] about

[11] **Backface deformations** (or backface signatures) refers to the size of the indentation in the backing material caused by a shot that did not perforate the body armor (NIJ Standard-0101.06). Although the armor is not perforated, these shots may result in Behind Armor Blunt Trauma (BABT), which may also require medical attention (Bir et al., 2011).
[12] A more comprehensive review of this study and its relationship to the current methodology will be detailed below in the literature review.
[13] Drawn from a random selection of law enforcement agencies nationally.

patterns in armor care, maintenance, and overall performance. Second, 29 officers[14] were interviewed about these same considerations to document the complete history of their body armor since originally being fitted for service. This same body armor was then subjected to rigorous ballistics testing and fiber analysis to see if maintenance and environmental factors may have had a negative effect on its overall sustained performance (as compared to brand new armor).

This national survey provides the field with the first study of officer self-reported body armor usage behaviors. While the sample sizes were small, the combined officer interviews (N=29) and body armor testing (N=30 used and 15 unused) represent an important exploratory effort that will have implications for the field and future replication studies.

[14] Thirty officers provided used body armor for testing and initially agreed to participate in the officer interview; one officer later declined to be interviewed.

REVIEW OF RELEVANT LITERATURE

In 1973, Officer Ron Jagielski became the first law enforcement official whose life was documented to have been saved by a concealable ballistic vest (Department of Justice, 2001). Since then, extensive funding and research have been expended on the further development of body armor that is cost-effective, suitable for daily use, concealable, and effective.

The first recorded firearms-related death of a police officer was in 1791. Since then more than 19,000 police officers have been killed in firearms-related incidents in the United States (1,626 in the last decade alone). It is estimated that at least 30 percent of these deaths since 1980 could have been prevented by the use of lightweight body armor, if it had been available to officers (Such armor did not become readily available until 1987.) (Bir et al., 2011).

The need for reliable protection systems for officers can be underscored by recognizing that more than 58,000 law enforcement officers are assaulted each year, resulting in approximately 16,000 injuries (NLEOMF, 2011).

How Armor Works in Practice – The Evolution of a Standard

As discussed above, body armor is designed to lessen the potential harm caused by bullets or shrapnel. Serious or fatal injury to the officer can be the result of penetration and/or the impact against his or her body.[15]

[15] In the United Kingdom and other European countries, "multi-threat" armors are specifically designed to offer both firearms and knife protection, but these are less popular in the United States, because the metallic array and chainmail necessary to protect against knives offers little ballistics performance.

To mitigate against this, woven lightweight ballistic resistant fabric, such as para-aramid, absorbs the impact of a bullet by "catching" it in a web of exceptionally strong fibers that deform the bullet and dissipate its energy as heat.[16] The armor consists of multiple layers of the bullet-resistant material which absorb energy as the bullet pushes against the vest and body wall (Carroll and Soderstrom, 1978). As the fibers absorb and disperse the energy, the bullet deforms or "mushrooms" (Global Security.org, 2011). Metal (steel or titanium), polyethylene, or ceramic plates can be used with a soft vest to protect the wearer from rifle shots as well as handguns, shotguns, and shrapnel (Security Resources, 2009).

Importantly, of the body armor models submitted to the Compliance Testing Program of the National Institute of Justice (NIJ), 53.3 percent were classified as "unique passed materials." This left 43.1 percent that were considered "failed models" according to *NIJ Standard – 0101.06, Ballistic Resistance of Personal Body Armor* (Sundstrom, 2010).[17] This current standard requires rigorous testing of body armor after it has gone through an environmental conditioning protocol, including conditions of high temperature, humidity, and mechanical wear before ballistic testing. The current standard as of this writing also includes testing body armor against updated ballistic threats, which reflect the firepower that officers face on the streets today (Sundstrom, 2010).

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[16] To date there are more than 100 body armor manufacturers producing body armor that have chosen to participate in the NIJ's voluntary Compliance Testing Program (see www.justnet.org/Pages/bodyarmor.aspx). Some of the most common names in ballistic-resistant materials are: DuPont's Kevlar®; Honeywell's Spectra®; Twaron Product's Twaron®; and Toyobo's Zylon®.

[17] This standard supersedes the previous 05 and 04 standards for body armor. NIJ established its first ballistic body armor standard in 1972, which has been revised several times.

Ballistics body armor testing against standards is done across the two principal considerations for officer safety discussed above: the ability of the bullet to penetrate the armor, and the degree to which an individual might be harmed by backface deformation even if the bullet does not go all the way through the armor.[18]

The ability of the bullet to penetrate the armor is measured with V50 testing. This is a ballistic test used to identify the velocity at which 50 percent of the bullets penetrate the armor, and 50 percent are stopped by the armor. Because a critical element of the success of the armor is its ability to "catch" the bullet in its fibers and diffuse its energy as heat, fiber testing is also a critical measure. Tensile strength is the maximum weight that a given material can hold without fracturing when being stretched, per area of the material.[19]

Backface deformations (or backface signatures) refer to the size of the indentation in the backing material caused by a stopped shot (NIJ Standard – 0101.06). As mentioned above, although the armor is not perforated, these shots may result in Behind Armor Blunt Trauma (BABT), which can also lead to serious injury to the officer requiring medical attention (Bir et al., 2011). Backface deformations are measured by shooting vests mounted in front of a backing material, usually modeling clay at a controlled temperature. After test bullets are shot, the depth of the indentation into the clay is measured.

There remains a need for non-destructive methods for evaluating whether a particular piece of soft body armor retains its protective capacity, without destroying the armor. This would allow labs to identify armor that may be

[18] Separate standards and tests exist for stab protection, such as the ice pick test.
[19] This is often referred to as PSI or pounds per square inch.

dangerously degraded due to environmental and care/use factors, without requiring agencies to sacrifice potentially usable armor (National Institute of Justice, 2011). These methods might identify changes in structure (chemistry, mechanical properties, etc.) that influence armor performance.

Body Armor Performance in Real World Conditions

On the night of June 23, 2003 a Forest Hills, Pennsylvania police officer, Edward Limbacher, emerged from an unmarked vehicle to apprehend a drug suspect. The suspect immediately fired upon Limbacher, striking him in his body armor with .40 caliber bullets. Despite the fact that he was wearing body armor, and the armor was designed to defeat .40 caliber bullets, he sustained severe (though nonfatal) injuries from a bullet penetrating to his abdomen. This was the first reported case in which body armor that met the NIJ standard failed to stop a bullet that it was designed to defeat (Tompkins, 2006).

NIJ later determined that the armor failed due to degradation resulting from environmental exposure of the Zylon® fibers, in a study of 103 used vests provided by police departments from across the United States. The ultimate tensile strength of the individual yarns removed from the rear panel of the officers' armor was up to 30 percent lower than that of yarns from "new" armor supplied by the manufacturer. Over half of the vests (58%) were penetrated by at least one round during a six shot test series. Additionally, 91 percent had backface deformations exceeding the NIJ standard for new armor (National Institute of Justice, 2007). *Most*

disturbing was the fact that only four of the 103 used Zylon ®-containing armors met all performance criteria expected under the NIJ standard for new armor compliance.

No correlation was found between the level of visible wear to the body armor panels and their ballistic performance. This meant that there was no easy way for wearers or their supervisors to easily recognize that their armor had lost its protective capacity. The government sued the manufacturers for conspiring to hide evidence that Zylon® vests failed to hold their strength well before their standard five-year warranty expired (while the body armor appeared to be in good condition).

On August 3, 2007, the Department of Justice announced that one model of Dragon Skin armor, produced by Pinnacle Armor, Inc., also did not meet the requirements of NIJ's voluntary compliance testing. Evidence was insufficient to demonstrate that the model in question (SOV 2000.1/MIL3AF01) would maintain its ballistic performance over its 6-year warranty period (Department of Justice-Office of Justice Programs, 2007). In 2010, Pinnacle filed for bankruptcy protection ("Pinnacle Armor, Inc. Files For Chapter 11", 2010), although the company continues to offer a variety of body armor and concealable tactical vests that it claims defeat NIJ Level I handgun rounds (Pinnacle Armor, 2011).

Most recently, the Department of Justice sued Honeywell International Inc. for allegedly knowingly selling defective material for bulletproof vests used by law enforcement agencies. Honeywell sold Zylon ® Shield material despite evidence that it deteriorated under hot and humid conditions. Once again, the government claimed that the vests would not remain effective for the five-year warranty period.

Body Armor Use Studies

The degradation of some body armor under real-world conditions has led to modifications in the testing standards. NIJ's 2005 Interim Requirements for Bullet Resistant Body Armor, issued in August 2005, take into account the possibility of ballistic degradation over time. These interim requirements were created to help ensure that officers are protected by body armor that maintains its ballistics performance during its entire warranty period.

This highlights the need for more extensive testing on the environmental and maintenance factors leading to performance deterioration (discussed in the next section and in key elements of the current study). Despite these challenges, there remains little doubt of the essential role played by body armor in reducing deaths and injuries to police officers.

As a result, the International Association of Chiefs of Police (IACP) has implemented initiatives such as SafeShield, Vests Save Lives, and the IACP/DuPont Kevlar Survivors Club, to inform officers about the importance of wearing protective vests while on duty (The International Association of Chiefs of Police, 2011). The Department of Justice encourages law enforcement agencies to provide body armor for officers. Since 1999, more than 13,000 jurisdictions have participated in the DOJ Bulletproof Vest Partnership (BVP) program. Approximately $277 million in federal funds have been committed to support the purchase of 800,000 vests (Department of Justice-Office of Justice Programs, 2012). In total, the cost of issuing body armor to the 236,000 officers who do not currently utilize it ($26 million) is less than the

economic costs[20] of not doing so ($51 million) (LaTourette, 2010). As mentioned in the introduction to this report, following a meeting in March 2011 between Attorney General Eric Holder and a group of police chiefs in which they discussed an increase in firearms-related police fatalities, the Department of Justice mandated that all 13,000 jurisdictions participating in the federal Bulletproof Vest Partnership (BVP) institute mandatory-wear policies.

In 2005, PERF and the Bureau of Justice Assistance (BJA) surveyed the 100 largest law enforcement agencies on their use of Zylon®-based body armor (86% response rate) (PERF, 2005). Almost all of the responding agencies reported that they were aware of NIJ's Body Armor Standard Advisory Notice about Zylon®-based vests. However, more than one-third of the agencies surveyed indicated that they still used body armor composed partly or entirely of Zylon®, though nearly all (N=27) of these agencies planned to replace the vests. Of the agencies that did not currently use body armor composed of Zylon®, almost one-quarter had used Zylon®-based body armor in the past. Most of the agencies that ceased using this type of body armor did so due to general uncertainty with the product, reports that highlighted failures of these vests, and/or the NIJ Advisory Notice.

More recently, in 2009 PERF and BJA completed the first nationally representative survey of law enforcement agencies focused on body armor policies and practices (PERF, 2009). The instrument collected data on the body armor policies of individual agencies, whether they provide officers with armor, as well as outcomes of body armor use and officer safety. The overwhelming majority (99%)

[20] This study included such factors as medical expenses and loss of officer productivity in the economic costs of not utilizing body armor.

of responding agencies[21] indicated that the officers used body armor, although only 59 percent *required* its use at least some of the time. Of those agencies requiring the use of body armor, only 45 percent reported having a written policy to that effect. The vast majority (87%) of respondents indicated that their agency was responsible for purchasing body armor for its officers.

In order to educate law enforcement agencies and their officers about safety-related issues, particularly with regard to body armor, IACP is currently spearheading a number of initiatives focused on the benefits of wearing vests, and encouraging their use and proper maintenance. In 2002, IACP's Division of State Associations of Chiefs of Police (SACOP) established SafeShield, a policy initiative encouraging chiefs to reject the philosophy that accidents and injuries are a reality of the job, and instead to embrace a "culture of safety." SafeShield promotes the identification of safety threats and solutions to improve policy, training, and equipment. SACOP contends that chiefs can control outcomes of policing situations through the use of protective equipment. In 2011, IACP issued a "Mandatory Vest Use by Police Officers" resolution, which encourages police executives to develop and impose mandatory body armor policies for their departments (The International Association of Chiefs of Police, 2011).

The current study revisits some of the above trends in body armor utilization from the perspective of sworn officers within randomly selected agencies from a national sample. Consequently, the study is able to look closely at officer compliance

[21] The initial sample size was 990 agencies. The survey yielded an 80 percent response rate, providing a final sample size of 782 participating agencies (PERF, 2008).

with organizational policies related to the care and maintenance of their body armor in a way that has not been previously done.

Key Variables Affecting Body Armor Degradation

As discussed above, a series of tragic incidents exposed the dangerous possibility of body armor degradation due to environmental factors (e.g. exposure to heat and moisture) and maintenance factors (e.g. storage and care).

The National Institute of Standards and Training (NIST) of the Department of Commerce provides ongoing technical consultation and research in support of NIJ's body armor program.[22] NIST currently has a number of projects focused on critically examining the performance of ballistic materials in the field to identify any potential problems that may be developing; improving body armor performance; increasing the quality demands placed upon armor manufacturers; and refining body armor test methodologies. For example, NIST has made efforts to establish conditioning protocols for soft body armor that can be used to pre-condition body armor before ballistic certification testing.[23]

Despite the seriousness of the issue, to date there has only been a limited amount of research in the published literature on the effects of degradation, storage, maintenance, hours worn, and the user's physical activity on body armor. Part of the

[22] NIST's role includes providing standards development services and technical support to the NIJ compliance testing program, conducting and overseeing research leading to improvements in the standards, participating in technical and practitioner communities, establishing collaborations with other contributors, addressing emerging armor issues, and recommending improvements to the standards and associated certification programs.
[23] NIST. (September 24, 2009) "Development of Soft Armor Conditioning Protocols for NIJ Standard—0101.06: Analytical Results". Retrieved from: http://www.nist.gov/customcf/get_pdf.cfm?pub_id=902601

explanation for this is the lack of non-destructive methods for evaluating body armor performance, particularly as it relates to the real-life daily conditions of sworn officers in the field. The current study will be an innovative exploratory effort in this area.

Many factors are thought to contribute to body armor degradation, including: heat, moisture, ultraviolet and visible light, detergents, friction, and stretching.[24] Prudent manufacturers design armor and supply care instructions to minimize the risk and likelihood of exposure to degrading properties, such as light and moisture. There is additional evidence that para-aramid fibers, also known as poly-p-phenylene terephthalamide (PPT), are susceptible to ultraviolet and hydrolytic degradation, compromising the overall structure (National Aeronautics and Space Administration, 1995). These susceptibilities have been known for many years, and body armor designs can protect against these factors for body armor applications.

Exposure to Moisture

As noted earlier, NIJ findings have suggested that the ballistic performance degradation in body armor containing Zylon ® is closely related to chemical changes in the chemical base of PBO, one of its main elements. Preliminary analyses indicate that this is most likely caused by exposure to external moisture (Department of Justice, 2007). When there was no potential for external moisture to

[24] NIJ (May 2, 2011). "Current and Future Research on Body Armor." Retrieved from: http://www.nij.gov/topics/technology/body-armor/research.htm

contact Zylon ® yarns, there was no significant change in the tensile strength.[25] That said, some analyses of PBO at the molecular level have revealed contradictory results with regard to moisture and heat exposure, while ultraviolet degradation is generally supported as a cause of degradation (Holmes et al, 2006).

Importantly, other studies have found that artificial perspiration had the same effect on body armor as water alone. Similarly, out of all cleaning chemicals, only chlorine bleach had a negative effect on yarn property; all other cleaning agents tested had the same effect as water (Chin et. al, 2009).

Care and Maintenance of Body Armor

Holmes et al. (2010) performed a controlled study during which PBO fabric was repeatedly folded in a manner that would simulate the proposed lifespan of actual vests. The study found a significant reduction in the tensile strength and strain of the fibers in the folded fabrics, and an overall change of the fiber structure.

Where Do We Go From Here? Antecedents to the Current Study Methods

For practical reasons, most of the previous studies on this issue have primarily investigated specific police agencies or local/state jurisdictions. As will be discussed in the methods section, this study sought to examine individual officers' body armor care and experience with their body armor, using a nationally representative sample.

[25] NIJ (2007, October 24) "Body Armor Research and Evaluation Results." Retrieved at https://www.nij.gov/nij/topics/technology/body-armor/results.htm.

To achieve this, the research methods utilized were inspired by Weisburd's (2001) study of the use of force. Weisburd used a multistage or "clustered" sampling method to arrive at his selected survey respondents of sworn officers. In his study, 5,042 police departments were in the sampling frame for possible inclusion.[26] The authors selected 121 agencies based upon size and region (113 agreed to participate).

Each of the participating agencies submitted their rosters of all full-time personnel, with their personal information and contact information. From these, the authors drew a weighted sample of 1,060 officers; 925 of these officers took the survey. The study sample characteristics included a weighted correction due to the stratified and clustered sampling procedures used.[27]

In the next section, we detail the specific application of these methods to the current study of body armor utilization and maintenance trends.

[26] Inclusion in the sampling frame required: primary responsibility for providing police services to a residential population; minimum of 10 full-time sworn officers; and being either a municipal or county police agency.
[27] Weighting was applied to each department and officer according to the actual population of American police officers they represented.

RESEARCH METHODS

The current study is the first major effort to study body armor utilization and maintenance factors from the perspective of sworn officers. As discussed above, this study had two related, but independent phases: 1) a stratified nationally representative survey of sworn officers in municipal, county, and state law enforcement agencies; and 2) exploratory ballistic and fiber testing of used and new body armor to analyze performance differentials by climate zone (temperature and humidity), protection level, age, and maintenance/experience factors in the life course of the armor (as recollected by wearer interviews).

PHASE ONE: THE NATIONAL BODY ARMOR SURVEY

Participants (Study Sample)

PERF randomly selected a sample of 1,378 officers to participate in the national survey of body armor utilization and maintenance. Of these, 1,080 (or 78.4%) completed the survey.

National surveys of sworn officers using probability sampling approaches are rare in the policing field, given the complexities involved in getting a valid sampling frame of sworn officers from which to draw the sample. However, given the potential regional differences involved in body armor use and maintenance, PERF wanted to be sure that the survey respondents adequately represented the true universe of municipal, county, and state law enforcement agencies nationally.

To accomplish this in the absence of a list of all sworn officers across the country, PERF decided to replicate the innovative methods used by Weisburd

(2001) in his study of use of force. This involves a two-stage sampling scheme in which a stratified random sample of agencies is first selected, and then a random sample of sworn patrol officers is drawn from rosters provided by the participating agencies.

a) Building the Sworn Patrol Officer Sampling Frames - Establishing a Stratified National Sample of Law Enforcement Agencies

The 2009 National Directory of Law Enforcement Agencies (NDLEA) database was used to draw a nationally representative sample of municipal, county, and state law enforcement agencies (stratified by region, type of LEA, and the number of sworn officers).[28] By using stratification to group similar units together, variability between groups was reduced (reducing sampling error and allowing a weighted mean to be produced that has less variability than the arithmetic mean of a simple random sample of the population). It also allowed for the identification of differences between groups.[29]

A power analysis determined that a sample size of at least 782 officers was needed to be able to estimate proportions to within ± 3.43 percent with a 95 percent confidence level (Beta=.80) and adequately represent the population.[30] To ensure

[28] The NDLEA database contains information on 15,763 law enforcement agencies from around the U.S. In addition to the name and address of the current chief executive, information in the NDLEA database includes the population served by the LEA, the number of officers in the LEA and the region in which the LEA is located.
[29] For example, LEAs of similar sizes could be expected to have similar responses.
[30] PASS 2008 software (Hintze, 2008) was used to conduct the power analysis.

that this number of sworn officers was attained, 96 agencies were selected, as discussed below.[31] Of these, 92 (95.8%) agreed to participate.

Defining the Strata. Given that the vast majority of law enforcement agencies in the United States employ 20 or fewer sworn officers, a *disproportionate stratified sampling approach* was used (also known as over-sampling) in which large agencies were over-sampled relative to smaller ones to ensure that the research team had enough large agencies to analyze.[32] Large agencies (with over 100 sworn officers) are much fewer in the total population of U.S. agencies than those with less than 20 officers, and thus would be lost if they were not over-sampled. Overall, there were a total of 15,413[33] agencies available for sampling across the strata.[34] **Table 1** provides a summary of the operational definitions for the three strata used in this study.

To obtain unbiased estimates for the disproportionate stratified sample and reduce any bias due to sampling error and/or non-response effects, the research team utilized post hoc stratification to weight the survey estimates and allow the analysis to better represent the population.[35] The calculation of the weight was fairly straightforward: it is simply the inverse of the sampling fraction used in the stratum. So, in a stratum where the sampling fraction is 1 in 10, all cases received a

[31] This estimation was based upon a review of the number of sworn officers available in each agency to be potentially sampled. As the study methods required cross-tabulation analyses, it was necessary that the final sample of respondents included at least two officers to a cell.
[32] Thus, the sampling fraction was different for the department size strata of our stratified sample.
[33] There were a total of 15,413 agencies with sworn officer information. The remaining 350 agencies were missing sworn officer information and were therefore not included in the sample frame.
[34] There were 350 law enforcement agencies that did not have department size available that were thus dropped from the sample, However, this was done based on the assumption that these agencies were not significantly different from the agencies that were selected.
[35] Post hoc stratification is a weighting method that adjusts for any differences between the survey data and the population in terms of a few key population variables.

weight of 10; and in a stratum where the sampling fraction is 1 in 22, all cases received a weight of 22.

Table 1. Study Stratification Variables

STRATA	OPERATIONAL DEFINITION
Region	**Region 1 (Northeast)**[36]: Connecticut, Massachusetts, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont **Region 2 (Midwest):** Iowa, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, North Dakota, Nebraska, Ohio, South Dakota, Wisconsin **Region 3 (South):** Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia, Washington, DC **Region 4 (West):** Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, Wyoming
Department Size	**Very small:** 1 to 24 sworn officers **Small:** 25 to 49 sworn officers **Medium:** 50 to 99 sworn officers **Large:** 100 to 499 sworn officers **Very Large:** 500 or more officers
Department Type	**Police Departments:** 12,642 available municipal police and 42 available county police departments **State Police Departments:** 50 available law enforcement agencies listed as State Police and highway patrols **Sheriffs' Departments:** 24 available Independent City Sheriff Departments and 3,005 County Sheriff Departments

Agency Level Sample Selection. Based upon the above stratification criteria, a sufficient number of agencies to ensure adequate representation to the population were randomly selected for possible study participation. In selecting the sample,

[36] **The U.S Census Bureau definitions** were used to carve out the four main regions used in this study. Importantly, the Uniform Crime Reporting Program (UCR) Program uses this geographic organization when compiling national crime data.

Tailored Statistical Solutions[37] (TS^2) included two agencies from each stratum.[38] Due to the potential for LEAs to refuse participation, there were an additional three agencies selected for each stratum to replace any refusals that were received.

The agencies were approached and asked to participate in the order in which they were selected. In other words, the first two LEAs for each stratum were asked to participate. If one of those declined, then the next agency in the list for that stratum was contacted and solicited for participation. If that agency declined, then the next one in the list was utilized until a suitable number of agencies had agreed to participate in the study.

b) Arriving at the Respondent Level of Data Collection - Random Selection of Sworn Patrol Officers from Participating Agencies

Once an agency elected to participate, a list of the patrol officers for that agency was provided to PERF and TS^2. From each agency's patrol officer rosters, officers were selected using either a stratified random sample based on officer gender, rank, and shift worked or a simple random selection method if the agency was unable or unwilling to provide gender, rank, and/or shift information.

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[37] PERF utilized Tailored Statistical Solutions (TS^2) to select the samples and weight the associated data. TS^2 is a business located in the Dayton/Beavercreek, Ohio area. TS^2 has a well-established working relationship with PERF, having provided statistical and sampling expertise on multiple federally- and privately-funded national projects. TS^2 has conducted research in other areas, as well, including occupational safety, human-body modeling, education, health care, and justice.

[38] There were two agencies per stratum with exceptions. For the State Police, none of the departments have sizes less than 100 sworn officers. Therefore there are not five department sizes for any of the regions where Department Type is State Police. In fact in Region 3 (South), there are no State Police Departments other than Very Large (500 or more officers). Thus TSS included two agencies from each of 47 strata present in the population; (1) 40 strata = 4 regions times 5 department sizes for the Police Departments and Sheriffs' Departments; (2) 6 strata = 3 regions times 2 department sizes for State Police Departments; and (3) 1 stratum = Region 3 (South) with 1 department size for State Police Departments.

The number of patrol officers selected to participate in the study was dependent on the size of the agency itself (see **Table 2**). For example, LEAs with only one officer had a sample size of one; LEAs with between two and nine officers had a sample size of two, etc. Again, this methodology was similar to that employed by Weisburd et al. (2001).

Table 2. Officer Sample Size Selection by Agency Size

Agency Size by Number of Sworn Officers	Number of Officers Requested to Participate
1	1
2 – 9	2
10 – 25	5
26 – 50	7
51 – 99	10
100 – 250	15
251 – 499	20
500+	25

c) Final Sample Weights

To correctly calculate the weights to be applied to the survey response, the population counts must be known. As stated earlier, the total number of agencies in the NDLEA was 15,763, but there were 350 agencies that needed to be removed because the listings lacked information about numbers of sworn officers. Population counts for weighting were reduced by 349 for Police Departments and by 1 for Sheriff's Departments, yielding new population counts of:

- Police Departments: **12,335** LEAs comprised of 12,293 Municipal Police Departments and 42 County Police Departments; and
- Sheriffs Departments: **3,028** LEAs comprised of 24 Independent City Sheriff Departments and 3,004 County Sheriff Departments.

Appendix A shows the population counts and the respondent counts for the surveys at the agency level, as well as the respondent counts at the officer level.[39] During the course of the survey, some agencies were found to have sworn officer counts that had fluctuated either through layoffs or additional hiring, causing the agencies to change strata. These agencies are shown as part of the respondent and population counts under the new, current department size.

The final weights for the sample were calculated on a per-agency basis. Since the respondent level was the officers, each agency's weight depends on (1) the number of officers at the agency, (2) the number of respondents from that agency, (3) the number of agencies within the stratum, (4) the number of respondent agencies within the stratum, and (5) the total number of respondents in the sample. The weights were standardized to maintain the overall sample size of 1,080 officers. Since there were 92 agencies that participated in the study, there were 92 different weights.

Measures

In collaboration with NIJ, PERF developed a 34-item instrument containing both open- and closed-ended questions for the NIJ Body Armor national survey. The survey instrument is included in **Appendix B**. Where relevant, space was provided to allow respondents to provide more detail than the close-ended items allowed,

[39] Sample counts are not shown since there were two agencies selected from each stratum.

such as following a response of "other" or as a follow-up to a response where additional qualitative information would be helpful.[40]

a) Description of the Survey Instrument

The survey instrument was divided into seven essential categories for understanding patterns and trends related to body armor utilization and maintenance:

- **Demographics** – age; gender; rank; years on the force; population served; and structure/timing of shift schedule;
- **Body armor care and usage** – reasons for wearing body armor; experiences where body armor has served as needed protection; and how the respondent stores and cleans the body armor after use;
- **Agency body armor policy –** type of formal body armor policy; respondent self-reported compliance with policy; perceptions of the likelihood of disciplinary actions for violation of body armor usage policy; and perceptions of general body armor use in the department;
- **Selection/Acquisition –** whether the agency or the officer purchases the body armor; reasons for selecting body armor; place and timing of body armor fitting; and overall satisfaction with current body armor fit;

[40] For example, if a respondent responded "yes" to the question "Have you ever had to replace your body armor before its manufacture warranty expiration date?" A follow-up open-ended question was "If YES, for what reason was your body armor replaced prior to its expiration date?"

- **Protection/Protective Capabilities –** level of body armor worn; respondent knowledge about the protective capacities of the body armor (true/false questions); respondent use of additional protective measures (trauma/ballistic plates); and whether or not the body armor is worn under or over the uniform shirt;
- **Maintenance, Training, and Inspection –** source of education about the care and maintenance of body armor; frequency and type of body armor inspections; and replacement practices;
- **Next Generation of Body Armor –** covers respondent recommendations for the next generation of body armor.

b) Review of Instrument Content

The PERF research team conducted two focus groups with line-level personnel, supervisory and command staff, and industry representatives to ensure that the survey would explore the latest developments and national trends in body armor, while at the same time assuring its local applicability and practical relevance. PERF also relied upon the collective experience of its staff, which is made up of academic researchers and former law enforcement practitioners, to review the content validity of the draft instrument, before its piloting in the field with all patrol personnel in a mid-size Eastern police department. Finally, the survey was also reviewed by NIJ representatives.

Since the survey was anonymous, PERF was not able to conduct cognitive interviews with individual pilot survey participants. Instead, the participants were

asked to complete the survey and provide feedback on the instrument. PERF staff also contacted other agency representatives for additional feedback. Particular attention was paid to determining whether survey questions were perceived by the respondents as intended by the project team. Comments were also solicited on the survey to ensure that only modest amounts of time would be needed to complete it, that the content would be adequate, and that it could be completed easily.

The survey was revised based upon feedback received from the above processes and was approved by PERF's Institutional Review Board (IRB).

Procedures

To achieve a good officer response rate, PERF used a proven survey distribution plan[41] that consisted of (1) three waves of surveys[42] and (2) reminder phone calls to the agency contact person. During the reminder phone calls, the agency contacts were reminded of the purpose and importance of the survey. They were sent another copy of the survey if they needed one, and were asked to return the survey within 10 days. PERF staff made subsequent phone calls until multiple surveys were received from a particular agency or until the chief executive of a non-

[41] The survey dissemination method utilized by PERF on this project was a modified version of the Dillman approach to achieving high survey response rates (Dillman et al. 2009).
[42] Multiple waves of surveys were disseminated with all officers selected from each agency until at least 60% of the surveys were received from a given agency. Officers were instructed to disregard the subsequent survey waves if they had already submitted a completed survey. This was necessary since the survey was anonymous and there was no way to determine which specific officers had responded and which had not.

responding department conveyed a clear refusal to cooperate. This dissemination strategy has yielded high response rates in previous survey research.[43]

In an effort to guarantee that the data is of the highest quality, normally all surveys would have been reviewed upon receipt. Any missing or questionable information would be flagged for follow-up and a trained PERF research assistant would call each respondent to clarify these data points. Since this was an anonymous survey, this was not possible. However, the data overall were very complete and accurate.

Data cleaning began upon receipt of each survey involving a thorough item-by-item review to make sure that all items had been completed and were within reasonable parameters. The data were also subjected to rigorous automated data cleaning procedures in SPSS.

PHASE TWO: TESTING BODY ARMOR DEGRADATION BY PHYSICAL AND EXPERIENTIAL FACTORS

Phase Two of this research builds on the results of the national survey in Phase One by evaluating the effects of the age, climate, experience, and maintenance factors on the overall degradation of body armor. Although the unit of analysis in this study was the actual body armor, each armor unit was linked to an individual

[43] PERF has consistently achieved high response rates in the past. PERF previously conducted the BJA-funded 2005 Body Armor Survey of the 100 Largest Law Enforcement Agencies, BJS-funded 2003 Sample Survey of Law Enforcement Agencies, the CDC-funded 2003 Workplace Violence survey, and the BJS-funded 2002 Census of Law Enforcement Training Academies and achieved response rates of 93% (93 surveys received/100 surveys sent), 90.1% (2841/3154), 75.9% (120/158), and 75% (515/687), respectively.

user (as described below), so that the measures related to experience and maintenance could be collected.[44]

Participants (Vest Study Sample)

a) Sample Selection Criteria

For this exploratory study, the researchers collected a sample of 30 used vests from agencies[45] distributed across the four climate zones of the country, to allow for sufficient numbers in each cell for between-group comparisons and to control for temperature and humidity[46]. A comparison sample of 15 new vests was also acquired. The climate zones were:

- High temperature/high humidity: the Southeast
- High temperature/low humidity: the mid-Atlantic and Southern Plains
- Low temperature/high humidity: the Pacific Northwest
- Low temperature/ low humidity: the Northern Plains and Upper Northeast

Due to the significant variations in body armor make and type in the field, primary fiber composition was identified as the main factor to drive selection: all body armor used in the study had to be either primarily comprised of woven aramid

[44] It was a central study requirement that all agencies submitting vests were able to link them to the respective officers who wore them during their life course in the field. This was sometimes problematic as many agencies stop tracking vests when they are decommissioned. In such cases, the agencies leave the old vests unmarked in a storage closet until disposal.

[45] The selected agencies for the Phase II study were not necessarily the same as those that participated in the national body armor survey (only 15 of the 30 vests came from agencies that participated in Phase I). There was no methodological reason for requiring that the Phase II vests came from Phase I study participants as it would be statistically unlikely that the same officer would be selected for both studies (even where an agency was participating in both phases). Instead, the researchers were most concerned with ensuring that a sufficient number of vests came from within each of the four climate areas to meet statistical assumptions.

[46] Although research literature suggests that moisture is the key component affecting performance degradation rather than temperature alone (see Chin et al, 2007), the researchers chose this regional distribution by census categories as a means to re-examine this issue in the exploratory study.

or a hybrid design (made up of a combination of layers of woven aramid, laminated aramid, and/or laminated polyethylene). All hybrid vests included in the study had to contain at least one layer of woven aramid to allow for the fiber extraction required for degradation analysis (described below).[47]

In addition to the fiber composition requirement, all of the used vests had to be within the range of 4 to 5 years old. The study required that the vests have sufficient field "experience," so newer vests were excluded. For the sake of consistency, only vests that were protection level II or IIIA were included in the study.

The researchers chose to only study vests designed for male officers for two reasons. First, early data collection efforts resulted in only one "female" vest out of 30 being offered for testing, so the research team became concerned about the practicalities of obtaining a sufficient number of female vests to be able to conduct even the most rudimentary cross region or climate comparison. The second reason was statistical: even if the team was able to find 15 female vests (half of the 30 that were tested), there would have been some climate zones with only one vest in them, and thus there wouldn't have been any way to make any statistical comparisons between either male or female vests.[48] While we acknowledge the limited statistical

[47] During the process that creates laminated layers of either aramid or polyethylene, the vest fibers are bound together so tightly that it is impossible to extract fiber samples for degradation analysis.
[48] In other words, with only one vest in a cell, there would be no way to say anything about that vest since there would be no comparison available to examine variability. In maintaining the sufficiency of power in order to test the factors about the viability of protection, we needed to make sure that we had sufficient numbers of vests. If we needed to add female vests, we would have needed to supplement the male vests, not replace them, which would have expanded the scope of this project. With the sample size of 30 vests, there is only enough power to test the items that are there without adding another factor (gender). In order to determine differences, there would need to be multiple

power of our male vest sample, we have enough units to have more than one from each climate zone represented, and can explore general differences.

b) Sample Selection Process

The 30 used vests obtained for the study were a "convenience sample" from law enforcement agencies that had vests that met the determined selection criteria and were willing to participate. In the beginning of the study, agencies agreeing to participate in the Phase I national survey were also asked if they would submit a vest for testing. Following a review of the initial vest sample received, specific agencies were targeted in the climate zones that were not adequately represented, regardless of their participation in Phase I or not. Once the 30 vests were identified for testing, the researchers offered to purchase replacement vests for any agency that hadn't already retired the vest. Pre-addressed FedEx slips were provided to each agency to ship their vest(s) directly to the team conducting the ballistics component of the degradation analyses (H.P. White Laboratories).

Distribution of Main Sample Characteristics. A critical requirement of the sampling process was that it produced a sample with sufficient numbers in the two main categories being examined for between group differences: climate zone and primary fiber composition.[49] Importantly, this outcome was achieved (see **Table 3**).

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vests within each cell or else there is no standard deviation or variance to be calculated. Statistical testing requires variability in order to have degrees of freedom to conduct a test.

[49] All vests were also required to be either protection level II or IIIA. While efforts were made to maintain equal numbers in each category, priority was placed on climate zone and primary fiber composition.

Table 3: Distribution of Body Armor Study Sample

CLIMATE ZONE	PRIMARY FIBER COMPOSITION	PROTECTION LEVEL
High/high	4 woven aramid 4 hybrid	4 Level II 4 Level IIIA
High/low	3 woven aramid 4 hybrid	5 Level II 2 Level IIIA
Low/high	4 woven aramid 4 hybrid	1 Level II 7 Level IIIA
Low/low	4 woven aramid 3 hybrid	3 Level II 4 Level IIIA

c) Acquiring a Comparison Sample of New Body Armor

Acquiring 15 new vests for comparison testing proved to be more complicated than anticipated, because the selected study vests all conformed to the .04 NIJ standard, whereas new vests all conform to the .06 NIJ standard.[50] The two standards are sufficiently different that comparing test results between the standards would be effectively meaningless. As a result, new vests were needed that conformed to the old standard. Because regular suppliers do not carry vests that meet an outdated standard, the researchers contracted with BAE Systems (Safariland™) to produce the vests to study specifications. In addition to conforming to the .04 NIJ standard, the vests had to also meet the other requirements defined by the researchers: they had to be primarily composed of woven aramid or a hybrid that contained a woven aramid layer, level II or IIIA, and male. The 15 vests produced were shipped directly to the laboratory for ballistics testing alongside the 30 older vests in the study. However, it is recognized that the new vests do not identically match the used vests.

[50] Again, this is because a main requirement of the study was that each vest be old enough to have had enough exposure to conditions and incidents in the field (resulting in the requirement that they each be between 4 and 5 years old).

Measures

Armor performance/degradation (through ballistics and fiber testing) was analyzed across physical and experiential variables in order to explore the complexities of degradation factors.

a) Physical Variables

Each of the following physical variables was documented at the time of sample collection as part of the research team's discussions with the respective law enforcement agency representatives.

- Age – number of years the body armor had at the time of testing (had to be within 4 to 5 years)
- Primary fiber composition – whether the vest consisted primarily of woven aramid or was a hybrid
- Protection level – whether the vest was level II or IIIA
- Climate zone – identification of which of the 4 regions the body armor came from (divided in terms of likely exposure to heat and/or humidity factors that have been shown in previous research to be linked to possible armor degradation).

b) Experiential Variables

The research team developed a structured interview guide to capture officer self-reported experiences with the body armor throughout its life course (including maintenance, care patterns, and other events that could have impacted the long-

term viability of the armor, such as exposure to extreme moisture or heat). This aspect of the research admittedly may be subject to some level of response bias, given its retrospective nature.

Included in these questions were many of the questions asked in the Phase I survey,[51] as well as more detailed questions on how their vest had fared physically over its lifespan.

Experiential variables captured in the study through the interviews include:

- Reported incidents involving impact of any kind (e.g. stabbings, shootings)
- Vest exposure to excessive moisture or heat
- Officer maintenance and care practices with the vest (e.g. folding, storage locations)
- Officer training related to use and care of the vest.

c) **Performance Variables (Armor Degradation)**

As described above, overall vest performance was measured through both ballistics and fiber testing processes. Subsequent analyses compared these results by select physical and experiential variables (the performance data was linked to the individual officer interviews corresponding to each tested vest).

[51] The project team opted not to send the entire survey to the interviewee, but instead included the most important survey questions on the interview instrument. The decision was made in an effort to reduce the burden placed on the officer since both the survey and interview were voluntary.

i) Ballistics Measures

- Ballistics limit testing (**V50 values**) - This measures the velocity at which 50 percent of the shots perforate (i.e., go through the armor) and 50 percent "partially penetrate" (i.e., are stopped by the armor) (National Institute of Justice, 2008) These shots from the "perforate" and from the "stopped" group are used to calculate a v_{50} velocity.
- **Backface deformations –** This refers to the depth of depression of rounds that partially penetrate the armor in a clay backing placed behind the tested vest plate to represent the plate being worn on the torso. Backface deformation measures are essential because even where a bullet does not penetrate the plate, significant injuries to the officer can occur from the impact of the strike.

ii) Fiber Testing Measures

- **Ballistic Performance Parameter (BPP) –** the BPP represents a composite of the following four key measures:
    - **Ultimate tensile strength** (**UTS**) – measures the maximum stress that a material can withstand just before the point of failure.
    - **Elastic modulus of the fiber** – measures the stiffness of the material, i.e., stress divided by the strain (e.g., steel is much stiffer than Kevlar).
    - **Density of the fiber –** the mass per unit volume of the material.
    - **Strain at failure –** measures how much the material has been strained (stretched) by the stress on it at the point of failure.

Procedures

a) Vest Owner Interviews

Phone interviews were conducted with the 29[52] officers who wore the used vests supplied for the study. The interview instrument was approved by PERF's Internal Review Board (IRB), and all participants provided their informed consent before being interviewed. The officer interview instrument is contained in **Appendix C**. Results of the interviews were kept strictly confidential to encourage officers to be open and forthright. The interviews took no more than 20 minutes to complete.

b) Ballistic Testing Procedures

H.P. White Laboratories[53] conducted ballistic limit testing on clay for the 45 vest assemblies (90 panels, which represents two panels per vest) in accordance with the abbreviated provisions of NIJ-STD-0101. Each of the vest panels was fixed on separate clay blocks and tested using the appropriate ammunition. For both Levels II and IIIA, two ammunitions were specified per threat level, so the front panel of each vest assembly was tested using one ammunition, and the back panel of each assembly using the other ammunition (see Appendix D for the data on both threat levels). Each cartridge was hand-loaded to achieve the velocities necessary to obtain a V50 value for each armor panel. A shot-by-shot record of the test was provided to the research team on a data record, including the weight and physical

[52] While we acquired body armor from 30 officers, one refused to participate, so interviews were conducted with the remaining 29 officers.
[53] H.P White Laboratories is an NIJ-approved ballistics testing facility based in Street, Maryland.

makeup of the armor panels (ply counts, description of material, etc.). Backface signatures were also supplied for all non-penetrating shots.[54]

b) Fiber Testing Procedures

i. General Sampling Procedures

Following the ballistic testing and officer interviews, the vests were returned to the research team's offices in Washington, D.C. There, with the assistance of an expert body armor consultant, fiber samples were extracted from each of the 45 tested vests using Kevlar® (woven aramid) scissors.[55] Using the back panel for sampling purposes, fibers were extracted from the woven aramid layer closest to the body, assuming that it would be the most exposed to sweat. The research staff cut around the bullet holes to create at least a 2-by-2-inch piece of woven aramid from each vest. Each fiber sample was placed in a sealed plastic bag, and was labeled according to the vest it came from. All 45 vest samples were mailed to the Physical Testing Laboratory, College of Textiles, North Carolina State University to conduct the fiber testing.[56]

The multifilament yarns were unraveled from each fabric sample in order to extract individual filaments for measurement of filament diameter and tensile properties. The warp and filling directions were not labeled in the fabric swatches and could not be determined in the small swatch size. For the diameter and tensile

[54] The research team also received a final cover letter report that summarized the information on the data record.
[55] Normal scissors are too dull to effectively cut through the vest material.
[56] The College of Textiles has over 110 years of teaching, research, and extension programs, and is a national leader in fiber analysis, being home to the Nonwovens Institute and the Textile Protection and Comfort Center, which offers research and testing capabilities to the industry.

measurements, five filaments in each fabric direction were randomly selected. Because warp direction could not be determined, the fabric directions were designated as Direction 1 and Direction 2. For both diameter and tensile measurements, the first five specimens reported for each sample represent Direction 1, and specimens 6 through 10 represent Direction 2.

ii. Diameter Measurement

To determine diameter, five fiber samples in each fabric direction were randomly selected for measurement by mounting the fibers on a glass slide for viewing on a microscope at 400X magnification (10X eyepiece and 40X objective). The microscope was a Motic B3 compound microscope with Motic Images Plus Version 2.0 digital imaging software. Proper calibration of the software allowed direct on-screen measurement of fiber diameters. A total of ten diameter readings were taken for each sample: five from Direction 1 fibers and five from Direction 2 fibers. The overall average of the ten readings was reported for each sample and used for subsequent tensile property calculations. For this sample, the coefficient of variability (CV) (i.e., the ratio of the standard deviation to the mean) provides an indication of how consistent the fiber sample diameters were. The CVs were calculated for each of the five diameter samples. Overall, 98 percent of the calculated CVs fell below 10 percent which provides good indication the fiber sample diameters were very consistent (see Appendix G, Table G-5).

iii. Specimen Preparation for Tensile Testing

Individual fiber specimens (five randomly chosen fibers from each fabric direction) were pre-mounted on small cards to facilitate handling for tensile testing. Small C-shaped pieces were cut from index cards for mounting, with the opening across the "C" measuring exactly one inch to correspond to the desired gauge length for testing. Welbond ® adhesive was used to hold the fiber at each end, making sure that the adhesive covered the card up to the boundary of the one-inch span. The fiber was placed across the one-inch opening, taking care not to exert stress upon or to stretch the fiber during mounting. See **Figure 1** for the appearance of the fibers on the mounted cards.

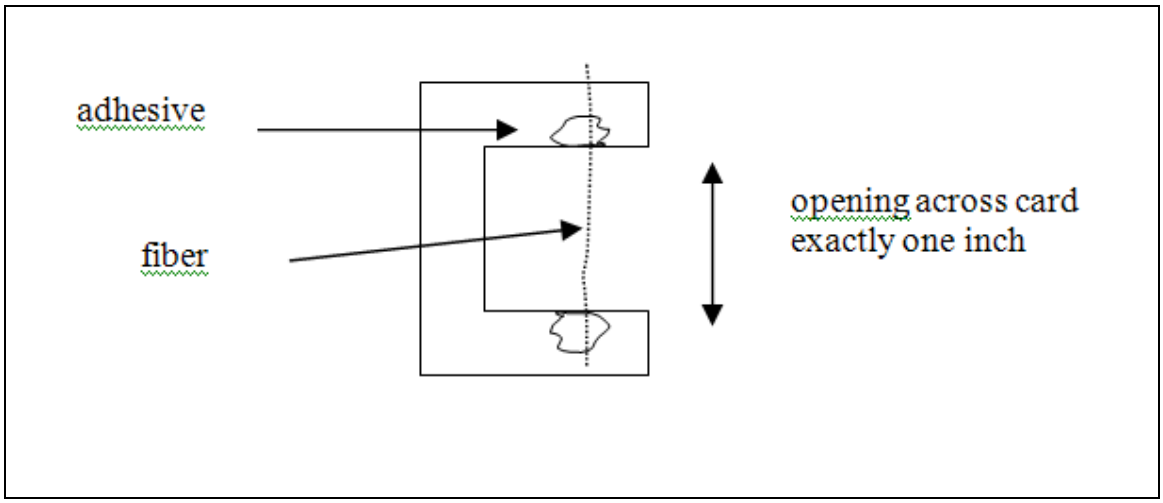

Figure 1. Diagram of the appearance of the fibers on the mounted cards.

The adhesive was allowed to dry overnight before tensile testing. Once the card and fiber were mounted in the clamps in the tensile tester, small scissors were used to trim the card away so that only the fiber extended across the opening between the clamps.

iv. Tensile Testing

For each sample, ten individual specimens were tested in general accordance with ASTM D3822, Tensile Properties of Single Textile Fibers, on a CRE-type MTS Q-Test/5 tensile tester (CRE=Constant rate of Extension). A test speed of 15 mm/min was used. The gauge length was exactly one inch. The following results were reported: tensile strength in units of megapascals (MPa), modulus in units of gigapascals (Gpa), and strain at failure in units of percent.

RESULTS

THE NATIONAL BODY ARMOR SURVEY

What follows are the main analyses conducted regarding the national body armor survey results, including descriptive statistics of the sample and statistical comparisons of the results by the region and agency size of the respondents' home agencies. A weighting scheme has been applied to the data with the purpose of making the results as nationally representative as possible.

In addition to the overall descriptive data presented below, the researchers also conducted chi square analyses to identify any differences in all variables by population density, region, agency size, agency type, and respondent gender. *For the sake of brevity, only where statistically and substantively significant differences emerged are these findings presented here.* The reader can find the full crosstab distribution tables in **Appendix E** for further information.

Respondent Demographics

a) Current Rank and Duty Assignment

In total, 1,080 individuals completed the survey. Of these, 89.3% were male, 10.7 percent female. The current professional ranks of these respondents varied, although the majority self-identified as an "Officer/Deputy/Trooper" (70.4%), followed by "Sergeant" (13.7%) and other ranks. [57] (**see Table 4**). More than half of respondents (51.0%) had eleven or more years of sworn experience; 29.8 percent

[57] The resulting distribution of respondent ranks is what would be expected in the field. Within these ranks, 76.2 percent of responding officers identified themselves as being "line level", while fewer reported being on the supervisory level (15.9%) or command level (7.8%).

had six to ten years of experience; and 19.2 percent reported having five years or fewer.

Table 4: Respondents' Current Rank

Rank	Percent
Officer/Deputy/Trooper	70.4
Sergeant	13.7
Lieutenant or Above	6.9
Investigator/Detective	6.0
Corporal	2.0
Other[58]	0.9
	N=1,080

Importantly, the vast majority of the respondents reported a current duty assignment that puts them actively in the field. Seventy-six percent of officers said that their job is performed primarily on the street, whereas 7.5 percent were primarily in the office, and 13.7 percent worked an equal combination of the two (N=1,055).

Most of the officers in the study sample worked a day shift. A plurality of respondents (44.9%) begin work sometime between 6:00 and 11:50 a.m. Few respondents started work between midnight and 6:00 a.m. (3.1%). Additionally, 39.5 percent of those surveyed work a rotating shift schedule, while 60.5 percent reported that they do not (N=1,066).

[58] Of the respondents who identified their rank as "Other," 70 percent were drug task force agents.

b) Density and Region of Respondent's Agency

Slightly more than half of respondents indicated that they serve an urban area (51.6%); 23.0 percent of officers said they work in suburban areas, and 10.5 percent in rural areas. The remaining 6.3 percent of responses is composed of "Other" (e.g. highway patrol, statewide jurisdiction), or hybrid areas that are not exclusively one type of region or that fluctuate seasonally.

Officer Behavior: Body Armor Usage

a) Prevalence of Officers Wearing Body Armor Regularly

Recognition of the importance of wearing body armor has become almost universal in the United States over the past thirty years. Nearly every officer responding to the survey (98.1 percent, N=1,051) stated that they currently wear body armor. Of the twenty officers who stated that they do not wear armor, the most common explanations were rank (command level, or detective), office duty, maternity duty, or improper/uncomfortable fit.

The inability to predict the circumstances that can arise daily in policing has led many departments to require officers to wear body armor at all times (see discussion below). The overwhelming majority of respondents indicated that they typically wear body armor when required to do so, reporting that they follow policy most of the time (11.4%), or all of the time (87.9%). Of those who said they did not always follow policy, explanations included such things as training exemptions, high temperatures, and working at a desk.

That said, safety considerations, as opposed to policy mandates, represent the main reason that officers give for wearing body armor. Ninety percent of the officers viewed body armor as "critical for (their) safety" (see **Table 5**). A significant number of officers (49.2%) also noted agency policy requirements as an important factor in their reasons for wearing body armor. Among the reasons classified as "Other" were habit, and leading by example. Women were significantly ($p<.05$) more likely to say they wear armor for safety (96.5%), compared to their male counterparts (89.2%).

Table 5: Reasons for Wearing Body Armor*

Reason for Wearing	Percent
Critical for Safety	90.0
Agency Policy Requires It	49.2
Family Pressure	14.3
Workers Compensation Issues	11.0
Other	2.3
*Multiple selections were allowed	N=1050

Although safety considerations predominated in all regions, wearing body armor due to agency policy was more likely in the Northeast (49.6%), South (56.0%), and Midwest (47.4%) regions. Fewer respondents in the West noted this response (41.6%). Officers in the smallest agencies (25 and fewer officers) and mid-size agency respondents (51 to 99 officers) were also more likely to cite agency policy, with over 60 percent of officers in both those size agencies indicating that

agency policy was a reason for wearing body armor. Roughly one in seven respondents (14.3%) indicated family pressure as a reason for wearing body armor.

b) Situations Where the Body Armor Provided Protection

Despite the fact that 80.8 percent of the respondents had more than 5 years of experience (with most having more than 10 years), 73.1 percent of respondents stated that they had never been in a situation where their body armor was required for protection (see **Table 6**).[59] Where officers reported their body armor having been used in the line of duty, protection from blunt force trauma, including punches and kicks, occurred with the greatest frequency (19.1%), while 8.1 percent said their armor helped to protect them in a car accident, 3.2 percent of officers experienced situations where they were shot at while in body armor, and 1.9 percent reported wearing armor during incidents in which they were attacked with knives or other edged weapons.

Table 6: Situations in Which Body Armor Has Protected Respondents*

Situation	Percent
Not Applicable (have never been in a situation where body armor was required for protection)	73.1
Protection from punch/kick or other blunt trauma	19.1
Protection in car accident	8.1
Protection during shooting	3.2
Protection from knife or other edged weapon assault	1.9
Other (specify)60	0.6
*Multiple selections were allowed	N=1,049

[59] This is to be expected given findings in other studies related to officer use of time and use of force.
[60] Most respondents who selected "Other" were protected by body armor during bicycle and motorcycle accidents.

As noted above, while the majority of respondents said they had not been in a dangerous situation in which their body armor was "put to the test," chi square analyses revealed some statistically significant differences ($p<.05$). Suburban officers were less likely to say that they had been in a situation where their body armor was required for protection (57.0%). Officers in urban departments (4.5%) and those in the largest agencies (4.5%) were more likely to report having been shot at while wearing armor, while officers in rural departments (5.7%) were more likely to report being protected from a knife thrust by their armor. Protection from a punch or kick was reported in roughly 30 percent of officers from agencies with fewer than 500 officers, but officers in the largest agencies reported such circumstances only 10.5 percent of the time.

In sum, while most officers reported wearing their vests because they saw them as critical to safety, relatively few had been in a situation where they actually had to rely on their vest for protection during a shooting, the situation in which their body armor was actually designed to protect them. Of the situations where body armor provided protection from an actual threat or harm, most involved a punch/kick (19.1%) or protection in a car accident (8.1%) rather than a shooting (3.2%).

Officer Behavior: Care and Maintenance of Body Armor

As discussed in the literature review, there is data supporting the contention that external factors (e.g. humidity in conjunction with high temperatures) can possibly play a role in overall performance degradation of body armor within five

years of use (Chin et al, 2007). This section examines officer patterns of body armor care and maintenance.

a) Body Armor Storage After Use

Participants were given the option of indicating all the ways that they stored their body armor following a shift by selecting as many answers as applied (see **Table 7**). Despite the fact that many manufacturers and police department policies recommend that body armor most optimally should be stored flat to best sustain body armor performance in the long run, the most common method of storage reported by officers was to hang their armor on a clothes hanger (57.1%). Forty percent (40.3%) of respondents store their armor by laying it flat after use. Ten percent (10.1%) of officers indicated that they used another method for storing their vests such as hanging the armor on the back of a chair, standing it up, or "throwing" it inside a locker.

Table 7: Storage of Body Armor after Usage*

Storage Method	Percent
Hang on clothes hanger (not specifically designed for body armor)	57.1
Flat	40.3
Specialized device/container	1.4
Fold it up	0.8
Other (specify)	10.1
*Multiple selections were allowed	N=1,057

When asked *where* they stored their armor while it is not in use, 55.9 percent of respondents said their locker. Forty percent (40.5%) of respondents (who were

allowed to choose more than one option, if applicable) indicated that they kept their vest at home. Officers also said they keep their body armor in a vehicle trunk (3.7%), vehicle interior (3.1%), gear bag (2.0%), and/or "Other" (2.8%). The most often cited location among those listed as "Other" was in an office.

Some significant differences in storage practices exist that might be worth further attention in future research. Respondents from the South were more likely to use an optimal method of body armor storage (roughly 60 percent) such as lying flat or keeping it in a proper storage container, compared to roughly 20 percent of respondents in the Northeast. Nearly 70 percent (69.7%) of respondents from the Northeast stored their body armor on a standard hanger, whereas only 39 percent of respondents from the South did. Some of this difference with Southern agencies may be related to agency size: officers in the smallest agencies (fewer than 25 officers) and middle size agencies (between 100 and 499 officers) were more likely to "lie it flat" and less likely to use a non-specialized hanger.

Not surprisingly, this pattern holds true when the data is looked at through the lens of population density served. Urban respondents were more likely to report hanging their armor on a clothes hanger not designed for body armor (64.1%) than respondents in other areas. The practice of laying their armor flat after use was more common among suburban officers (52.0%) than the population of officers as a whole (40.6%), or in any of the other agency categories individually.

Women were also more likely than men to report optimal storage practices. They were far more likely to lie their armor flat (61.9 percent versus 37.6 percent of

men), and less likely to use a clothes hanger not designed for body armor (44.2 percent compared to 58.7 percent of men) for body armor storage.

b) Body Armor Carrier Cleaning Practices

Ballistic protection is afforded by the armor panel – not the carrier – making most forms of body armor carrier care or cleaning unlikely to affect body armor performance.[61] However, as this was an exploratory study of the relationship between officer behavior and performance degradation over time, the researchers asked officers about how they clean their body armor carrier as a means of providing additional descriptive information. Respondents could select more than one method of cleaning. More than half of respondents (51.0%) said that they use laundry detergent; the next most common responses were soap and water (38.9%), and fabric deodorizer, such as Febreze (33.8%). Only 3.3 percent said that they have their carriers professionally cleaned, while four percent checked "other." The most common explanation by those who selected "other" was that they never cleaned it.

Agency Body Armor Policy

The presence of a formal, clear, and specific policy has been shown to have a significant impact on a wide range of officer behaviors, ranging from report-writing and professional communication with citizens to use of force. A component of such policy is enforcement of the rules with fair disciplinary procedures.

[61] A carrier is defined by one manufacturer as "A component of the armor sample or armor panel whose primary purpose is to retain the ballistic panel and provide a means of supporting and securing the armor garment to the user. These carriers are not generally ballistic resistant."(Body Armor.com, 2011)

a) Existence of Formal Body Armor Policy

Seventy-eight percent (77.9%) of officers reported that their agency does have a written body armor policy, while 22.1 percent said that theirs does not.[62] Importantly, 57.0 percent of officers in an agency with written body armor policy indicated that it requires wearing body armor at *all* times when on duty. Slightly more than one third (35.3%) of respondents in agencies that have a written policy said that they are required to wear body armor *most* times (see **Table 8**). Thus, more than 92 percent of responding officers reported that they are required to wear body armor. Among the policies that fell into the "Other" category were: having the vest available in the cruiser; not requiring officers to wear the armor when the temperature is over 95 degrees; requiring that body armor only be worn if it is department-issued; and having the option to sign a waiver to not wear it.

It is interesting to note that although 57.0 percent of respondents indicated that they must wear their armor at all times while on duty, there are some differences according to population density. An "at all times when on duty" response was most often the case for rural (72.2%) and suburban (63.1%) respondents, with roughly half of respondents (50.6%) from urban and forty-seven percent (46.5%) of those in "other" areas reporting that they were required to wear armor all of the time.[63]

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[62] As will be highlighted in the discussion section, this suggests an important increase since the 2008 BJA-PERF survey in which fewer than half (45%) of the responding agencies indicated that they had a written policy requiring their officers to wear body armor. It should be stressed, however, that the previous survey represented an agency rather than individual officer level survey so the results are not directly comparable.

[63] The much higher number of officers in agencies serving urban areas (51.6%) drags the overall mean down significantly from the numbers reflected in the suburban and rural sites.

Table 8: Agency Body Wear Policies

Policy	Percent
I am required to wear body armor at all times when on duty	57.0
I am required to wear body armor at most times when on duty	35.3
I am not required to wear body armor at all times, except in special circumstances	3.7
Other	4.0
	N=789

b) Policy Enforcement and Perceived Compliance of Colleagues

Respondents were also asked what they thought the consequences might be for failing to comply with body armor policy (more than one response could be selected) (see **Table 9**). As less than one percent of officers said they had ever received discipline for a body armor violation, most had to speculate or base their responses on knowledge of other officers having been disciplined. More than half (58.3%) said they expected that a first offense would result in a verbal reprimand, and a second offense would result in a written reprimand (58.3%).

Table 9: Expectations of Consequences for Failing to Comply with Policy*

	Percent	
Discipline	**1st Offense**	**2nd Offense**
Verbal reprimand	58.3	16.5
Sent to retrieve and wear body armor	38.2	21.6
Written reprimand	31.2	58.3
Policy is not enforced	5.7	5.0
Suspension	4.9	20.3
Termination	0.8	2.1
Fine	0.2	1.8
Other[64]	3.6	1.9
*Multiple selections were allowed	N=820	N=814

[64] Those who marked "Other" indicated that they might lose vacation days, that their use of armor had never been checked by a supervisor, or that they did not know the consequences because they were not outlined in the policy.

Importantly, only 5.7 percent of respondents believed that the policy is not enforced. As a result, when asked to make an educated guess about the compliance of their platoon, 96.6 percent of them responded that they think policy is followed by three-quarters or more of their colleagues (see **Table 10**). Similarly, 93.8 percent of respondents indicated that the patrol leadership within their agency was supportive of wearing of body armor. Of those officers who indicated that their patrol leadership was "unsupportive" or "somewhat supportive" of wearing body armor, most referred to a lack of checks or infrequent checking of armor use by supervisors, having to be refitted on their own time, or a lack of uniform requirements for who had to wear vests. Among those who said their agency was "Very Supportive" of wearing vests, a large percentage mentioned inspections, strong encouragement to wear, mandatory policy, and having armor provided to them by their agency.

Table 10: Respondents' Estimate of the Percentage of Their Platoon Members Who Adhere to Body Armor Policy

Compliance	Percent
0-10%	0.2
26-50%	0.3
51-75%	2.9
76-99%	27.9
100%	68.7
	N=778

That said, only 28.6 percent of respondents said that their agency conducts inspections to ensure that they are wearing body armor, and just 9.3 percent check for proper maintenance. Of those who said that armor wearing is inspected, more than half said it occurs multiple times per year (see **Table 11**). Checks for

maintenance are less frequent, and seem more likely to occur once each year. The most common response with regard to who conducts inspections was first-line supervisor. Among those who selected "Other," most indicated that inspections for wearing or maintenance are conducted by firearms instructors or other range personnel.

Table 11: Body Armor Inspection Frequency and Inspectors

		Check that Officers are Wearing (%)	Check for Proper Maintenance (%)
Inspection Frequency	Monthly or more frequently	33.9	8.6
	Multiple times per year, but less frequently than monthly	26.7	21.1
	Once per year	5.8	44.7
	Every two years	0.0	4.7
	Vests are randomly inspected, not necessarily every year	33.6	21.0
		N=281	N=90
Inspector	First-Line Supervisor	88.3	68.6
	Commander	1.5	2.5
	Chief/Sheriff	1.0	3.0
	Other	9.2	25.9
		N=267	N=88

Body Armor Selection/Acquisition

a) What Are They Currently Wearing?

Most of the officers' body armor is within the recommended five-year age window of most manufacturer warranties. The vast majority (93.2%) of respondents (N=940) reported having armor that had been purchased between

2005 and 2010. Only 5.1 percent of officers had vests predating 2005, with the oldest having been purchased in 1980.

The protective rating of body armor ranges from level I to level IV, with level IV being the highest protection available. The majority of respondents (88.7%) indicated that their body armor is level IIA, II, or IIIA (see **Appendix D** for a description of the various body armor protection levels). Only 9.7 percent of officers had level III, and less than one percent had either level I or level IV. Three quarters of respondents also receive additional protection in the form of trauma/ballistic plates with their armor. Most of those who use supplemental plates only utilize a front panel (92.2%); 7.6 percent use both front and back panels, while 0.2 percent only use back panels.

Additionally, 90.5 percent of officers use an internal body armor carrier (worn under a shirt), while 2.6 percent use external (worn over a shirt); 6.9 percent of respondents said that they use both types of carriers. Many officers expressed a desire to switch from internal to external carriers, for reasons of comfort, and the ability to put it on or take it off more quickly.

b) Agency Body Armor Acquisition Policy

Indicative of the growing recognition of the importance of body armor to officer safety by police leaders, nearly all officers surveyed have their body armor

issued to them by their agency (see **Table 12**), with less than ten percent of respondents purchasing armor themselves.[65]

Table 12: Who Acquires Officers' Body Armor?

	Agency Issues Armor (%)	Officers Purchase Armor (%)
No	1.5	91.8
Yes	98.5	8.2
	N=1,025	N=681

c) Body Armor Selection Criteria

For the officers who are responsible for selecting their own armor, protection and comfort appear to be the two most important criteria (see **Table 13**). Many officers also considered price and overall performance (ability to defeat officer rounds, NIJ standard, brand confidence) when selecting their body armor.

Table 13: Most Important Body Armor Selection Factors*

Factors	Percent
Protection Level	75.0
Comfort	70.5
Price	27.1
Ability to Defeat Rounds from Officer's Weapon	18.5
Meets NIJ Standard	18.4
Confidence in Brand	17.2
Warranty	10.1
Referrals	6.7
Other	24.2
*Multiple selections were allowed	N=52

When asked what changes they would like to see in the next generation of body armor, officers responded in the following way (see **Table 14**):

[65] Some officers indicated both that their agency issues armor *and* that they are able to purchase their own armor if they choose to do so.

Table 14: Desired Changes for the Next Generation of Body Armor*

Changes to Body Armor	Percent
Improved comfort (e.g., breathability, cooler, etc.)	**84.8**
Improved fit	**72.6**
Reduced weight	**63.9**
Improved protection	**62.4**
Improved durability	**26.5**
Integral locations on vest to affix badge, weapons, police radio microphone, and/or other equipment	**20.3**
Integral drag strap for removing injured officers	20.1
Fire resistant material	17.3
Modular design allowing for add-on protection when needed (e.g., neck, shoulders, groin)	15.3
Improved access to weapons and utility belt	11.8
Improved breakaway components	9.2
Other	9.2
*Multiple selections were allowed	N=996

The most popular improvements officers wish to see in their vests are increased comfort, fit, and protection; this echoes the qualities that officers who provide their own armor said they look for in a vest. While only 11.8 percent of respondents said that they would like improved access to weapons and their utility belt, many who selected "Other" indicated that they would like a place for a backup weapon in the armor itself. Additional changes officers wish to see include:

- improved fit for women,
- more coverage on shoulders, sides, midsection, and under arms,
- wider usage of external carriers,

- a place to leave instructions for EMS, and
- more durable carriers that stay in place, and

d) Body Armor Fitting

The large majority of officers surveyed were fitted for their body armor (see **Table 15**). Most (69.9%) indicated that they were fitted by manufacturer representatives or police agency representatives (19.2%). Far fewer respondents (5.4%) said that they were fitted by both. Of the officers who were fitted for armor, 96.4 percent were sized at the time of the order. Only one quarter of officers were fitted again when the body armor was delivered, and of those who were re-fitted upon delivery, only 14.5 percent had their size checked on again.

Table 15: Type of Body Armor Fitting

Fitting Type	Percent
No fitting; size approximated	5.6
Fitted by manufacturer representatives	69.9
Fitted by police agency representatives	19.2
Fitted by manufacturer and agency representatives	5.4
	N=1,027

More than half of respondents (58.6%) said that they are satisfied with the fit of their current body armor, while 29.0 percent of officers surveyed reported being dissatisfied.

e) Body Armor Replacement Rationale

Only 6.6 percent of respondents said that they have had to replace their body armor prior to the manufacture warranty expiration date. Reasons for premature replacement included being shot, motor vehicle accidents, department upgrades, sizing issues, and submersion in water. However, the most frequently cited reason for replacing armor was manufacturer recall.

When an officer's body armor is taken out of service, replacement body armor is not immediately available for more than half (51.0%) of respondents (see Table 16).

Table 16: Availability of Body Armor for Immediate Replacement

Availability	Percent
Not available	51.0
Yes, from agency	40.3
Yes, from vendor	3.7

Body Armor Training

Most officers indicated that some sort of body armor training was provided with regard to its benefits and limitations, as well as care and maintenance. Slightly more than half of officers were trained in both areas by reading literature provided by the manufacturer. The other common forums for body armor instruction include the academy and firearms training (**see Table 17).**

Table 17: Body Armor Training Formats*

Training Format	Benefits and limitations of body armor	Body armor care and maintenance
Manufacturer-provided literature/manuals	53.5	58.5
Academy	34.5	19.7
Firearms training	23.5	7.6
None was provided	21.5	27.8
Manufacturer/ supplier representative	16.2	14.4
Department-provided literature/manuals	14.8	11.7
Supervisory staff	12.2	7.4
In-service/ specialized training	10.4	4.8
Roll call	4.9	1.6
Other[66]	0.6	1.1

*Multiple selections were allowed

Overall, roughly 1 in 5 (21.5%) respondents did not receive any training related to the benefits and limitations of their body armor. This finding was relatively consistent across different types of jurisdictions. Regarding care and maintenance, roughly 27 percent (27.8%) had not received this training, with this being slightly more common in rural settings (33.3%) than in urban or suburban agencies.

[66] Training classified as "Other" primarily consisted of personal research conducted by the officers.

Officer Knowledge of Proper Body Armor Care and Usage Factors

One indication of the extent to which officers are adequately trained about their body armor is an assessment of their overall knowledge of what their body armor does and does not protect them from, as well as proper care and maintenance behaviors. Fortunately, the officers scored very well on their overall body armor knowledge, as shown in **Table 18,** with over 90 percent of officers scoring correctly on most items, with one exception: Many officers do not know that moisture can reduce the effectiveness of body armor.

Table 18: Body Armor Statements Believed to be True by Officers

True Statements about Body Armor	% of Officers Who Believe Statement is True
Body armor is NOT designed to last indefinitely	99.2%
My body armor can NOT stop rifle bullets[67]	97.2%
Body armor should be replaced if penetrated by a bullet	95.4%
Body armor should NOT be cleaned thoroughly with standard laundry detergent and washing machine	90.9%
It is NOT acceptable to store body armor in the trunk of a car	89.3%
Moisture reduces the ballistic protection of body armor	35.5%
	N=1,022

[67]It is possible that a respondent's perception of whether or not their armor is designed to stop rifle bullets could vary by their own body armor protection level (since some body armor levels protect against this threat). For increased precision, the research team performed crosstab analyses of respondent armor level by perception that his or her "body armor can stop rifle bullets." The majority of respondents understood that their armor could not stop rifle bullets irrespective of level. Further, no one with the highest body armor levels (i.e., Level III and IV) reported a belief that their body armor could stop rifle bullets, although their armor is designed to defeat such rounds. All of those who reported this perception used Level IIIA or lower – which do not have this capacity.

There are no obvious agency size differences in body armor knowledge questions.

TESTING BODY ARMOR DEGRADATION BY PHYSICAL AND EXPERIENTIAL FACTORS

This section covers the results of ballistic testing of new and used body armor that had been worn by officers in different regions of the country to assess the effects of environmental conditions (i.e., heat, humidity and other conditions as reported by officers who wore the armor). The testing measured effects on the ballistic performance (V50 limit) of the armor. In addition, fibers from both the new and used armor were tested to see if there was any change in the elastic modulus, tensile strength and strain to failure of the fiber (specific strain energy and sound velocity in the fiber) that could account for any changes in the ballistic performance.

Recap of Project Methods

A study was set up to look at environmental and handling effects on the ballistic performance of five-year-old soft body armor worn by police officers. In order to assess the environmental conditions, the country was divided into four different regions based on levels of heat and humidity. The regions were: high temperature/high humidity, high temperature/low humidity, low temperature/high humidity and low temperature/low humidity. PERF also asked the officers in these regions to participate in interviews that were meant to see how the officers handled their vests. Additionally, it was decided to use a tool for assessing the ballistic

performance of fibers from their yarn properties based upon the work of Phoenix and Porwal (2005), Cunniff (1999) and Cunniff, et al. (2002) to see if there was any correlation between the change in the V50 of the armor with any changes seen in the mechanical properties of the individual fibers. This analysis will only provide an "estimate" of potential performance capability of the material, because it does not include the packaging of the fabric in layers and the integration of the fabric into the outer shell to produce the armor system. This tool depends on the specific strain energy in the fiber and the speed of sound in the fiber:

$$(1)\ BPP = [U]^{1/3} = \left[\frac{\sigma\varepsilon}{2\rho}\sqrt{\frac{E}{\rho}}\right]^{1/3}$$

We are assigning the term Ballistic Performance Parameter (BPP) to the expression $[U]^{1/3}\{m/s\}$, and σ is the fiber ultimate strength, ε is the fiber ultimate tensile strain, ρ is the fiber density and E the linear elastic fiber modulus. The expression $\frac{\sigma\varepsilon}{2\rho}$ is the fiber specific strain energy and the expression $\sqrt{\frac{E}{\rho}}$ is the speed of sound in the fiber. The V50 ballistic limit of the soft armor vests along with the results of fiber testing on new and used fibers will be used to assess any changes seen when comparing the performance of new and five year old soft armor vests.

Testing

In order to compare the five year old study vests with the new vests, all tests were performed in accordance with NIJ Standard 0101.04. The summary data are shown in **Appendix F,** with Table F-1 for new vests and Table F-2 for used vests

(shot by shot test results are located in Table F-3). Once the ballistic testing had been performed, fibers were removed from the woven fabric vests and sent to Dr. Janet Ballard at the North Carolina State University College of Textiles for individual fiber testing. Forty five samples were supplied and pulled in tension in accordance with ASTM D 3822 in MTS Q/test/5 at a rate of 15 mm/min to failure. Ten samples were taken from the rear and 10 samples from the back of each of the Level II and Level IIIA vests.

The summary data for density, tensile modulus, tensile strength and strain to failure are in **Appendix G,** shown in Tables G-1 and G-2 for new and five year old vests, respectively. Given the fact that, by necessity[68] the research design had to rely on the use of vest comparisons of different makes and models, the reader should be cautioned against generalizing from the findings. Any results found herein should only be used to stimulate ideas and directions for future research.

Ballistic Performance Parameter Results

i. V50 Ballistic Testing

The ballistic data was analyzed by looking at the average V50 limits[69] and backface deformations for: each vest level, each type of vest (Hybrid or woven fabric), each ply level (the number of plies in the vests varied from 12 to 34) and each region of the country. **Figure 2** shows the V50 limit for the Level II and IIIA soft

[68] New vests of the same make and model were unavailable. The manufacturers that were contacted were unwilling (due to ordering such a small number) and/or unable (some of the materials utilized to make the 04 vests were no longer in production) to do so. Faced with this reality, the research team, including federal representatives and body armor experts, made the decision to make comparisons between the available vests. This, of course, impacts research precision, and hence, the need for caution in interpreting the results.

[69] Average V50 is commonly used as a measure of ballistics performance in the research literature.

armor vests as a function of the number of plies. For the Level II vests with 13-14 plies, the comparison between the new and used shows a slight decrease in performance, from 1531 ± 23 feet per second (fps) for the new vests to 1492 ± 18 fps for the used vests. In comparing the new vest with 26 plies with the used vests of 24 plies, there was a very definite decrease in the average ballistic limit from 1701 ± 4 fps to 1585 ± 64 fps (approximately 7 percent). However, there may be an increase in the V50 of the used vests if we had data for 26 plies (if the results with the used Level IIIA vests with 29-34 plies are any indicator, there may be no difference). The average V50 for the Level IIIA vests for 29-34 plies had a decrease in the V50 limit from 1836 ± 29 fps to 1648 ± 33 fps, or about a 10 percent decrease. There was no difference in the averaging of the used vests with 29, 31, or 34 plies (i.e., the average V50 limit for the 29 plies was no different than that with 34 plies, so they were all averaged together). The authors of this study had no control over the number of plies, types of body armor or the types of fabric within the armor of the used body armor they would receive from the field. Therefore, when comparisons were made with new body armor that had been tested according to NIJ 0101.04, only the most basic comparisons could be made. The V50 ballistic limit and deformation in clay were the only two measures that the authors were aware of that could be used to compare the used with the unused body armor.

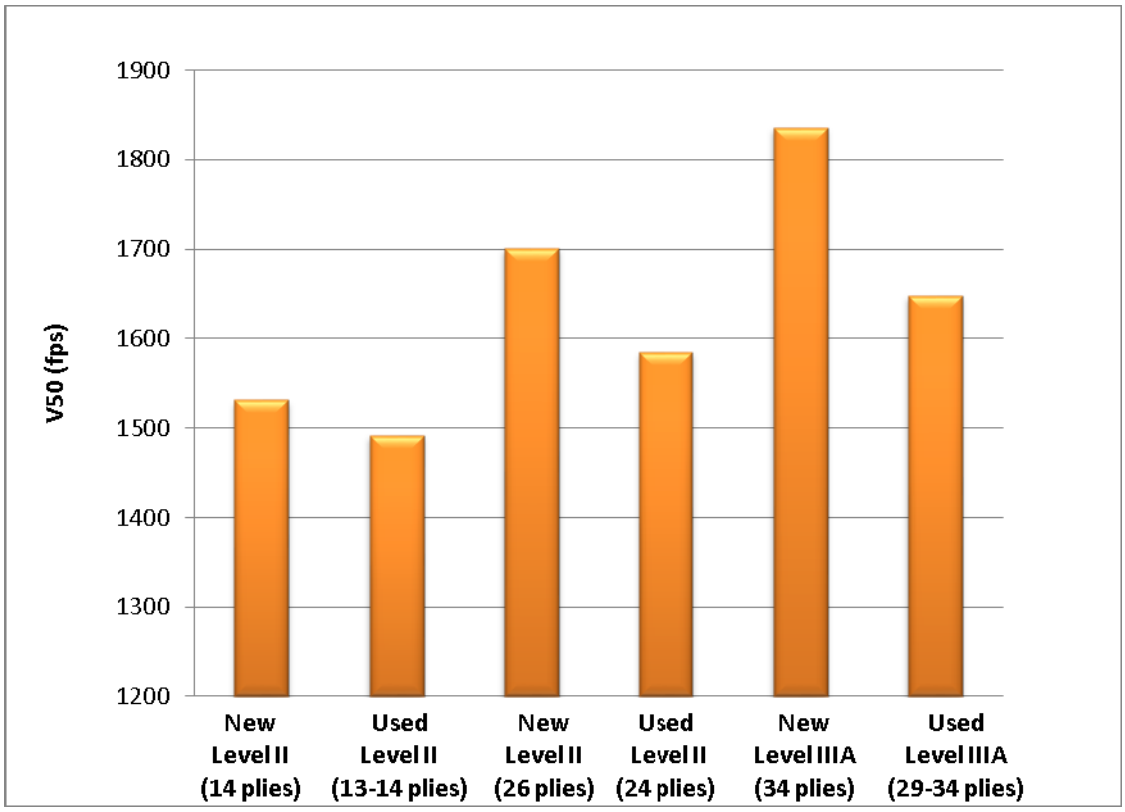

Figure 2. V50 limit for Level II and Level IIIA soft armor vests as a function of number of plies in the vest for new vests and 5 year old vests tested in accordance with NIJ 0101.04.

When the V50 ballistic performance was examined by different temperature-humidity regions of the country, the results showed the same decrease for new and five year old vests, but gave no indication that temperature or humidity had an effect. **Figure 3** shows the average V50 ballistic limit for the Level II vests, for the high/high (temperature/humidity), high/low and low/low regions of the country. To the far left of this figure is a comparison of 14 ply new vests with 14 ply used vests from the high/high region. The new vests had an average V50 limit of 1530 ± 23 fps, while those vests as taken from the high/high region had an average V50 limit of 1503 ± 4.9 fps. Therefore, there was basically no temperature/humidity effect on ballistic performance. However, the new 26 ply Level II vests had an

average V50 ballistic limit of 1701 ± 4.3 fps and the used vests from the high/low and low/low regions of the country, with 24 plies, had V50 ballistic limits of 1543 ± 40 fps and 1557 ± 26 fps, respectively.

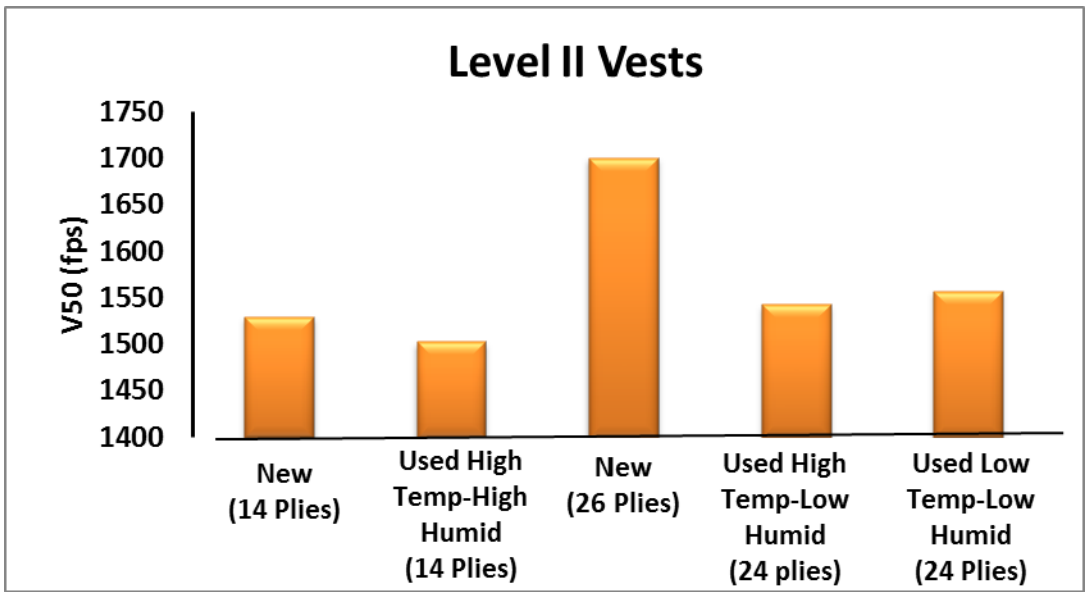

Figure 3. V50 limit for Level II soft armor vests as a function of the number of plies for new and 5 year old vests tested in accordance with NIJ 0101.04.

However, as previously mentioned, this is comparing 26 plies in new vests to 24 plies in aged vests, so it is possible that the V50 limit could increase some if a comparison could be made with 26 plies. So there may be a difference, but it does not appear to be a temperature/humidity difference, because it is the same for both regions of the country (high/low and low/low).

Figure 4 shows the average V50 ballistic limit for the Level IIIA vests for the high/high, high/low, low/high and low/low (temperature-humidity) region. For new vests, the average ballistic limit was 1836 ± 29 fps, while those of the high/high, high/low, low/high and low/low regions were 1631 ± 55 fps, 1659 ± 28 fps, 1625 ± 50 fps, and 1639 ± 20 fps, respectively.

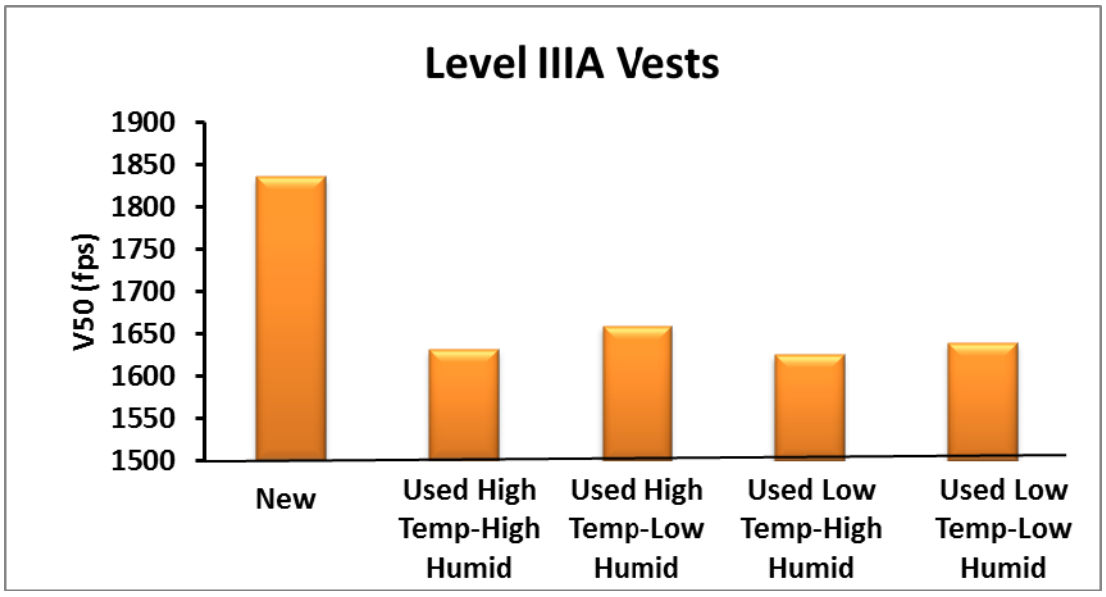

Figure 4. V50 limit for Level IIIA new compared to 5 year old soft armor vests that have been subjected to different levels of temperature and humidity tested in accordance with NIJ 0101.04.

Figure 5 shows the V50 ballistic limit for 5 year old Level II and Level IIIA soft armor vests as a function of hybrid and woven fabric vests. The V50 ballistic limit for Hybrid 14, 20-24 and 31-39 ply vests were 1504 ± 5, 1563 ± 55 and 1614 ± 22 fps, respectively, while that for the woven fabric 24 and 30-34 ply vests was 1567 ±33 and 1641 ± 26 fps, respectively. The V50 for the woven fabric and hybrid soft armor vests for like number of plies (i.e., 14, 20-24, 30-39) was approximately the same, and the V50 increases approximately the same for each material as the number of plies increase. The results of the officer interview instrument were reviewed and it was determined that the only other factor that should be examined is the effect of officer recollection of the vests being soaked in water or sweat at some point in their use. Therefore, those cases were separated from the others and a comparison in V50 ballistic limits was made for both the Level II and Level IIIA vests, as shown in **Figure 6**.

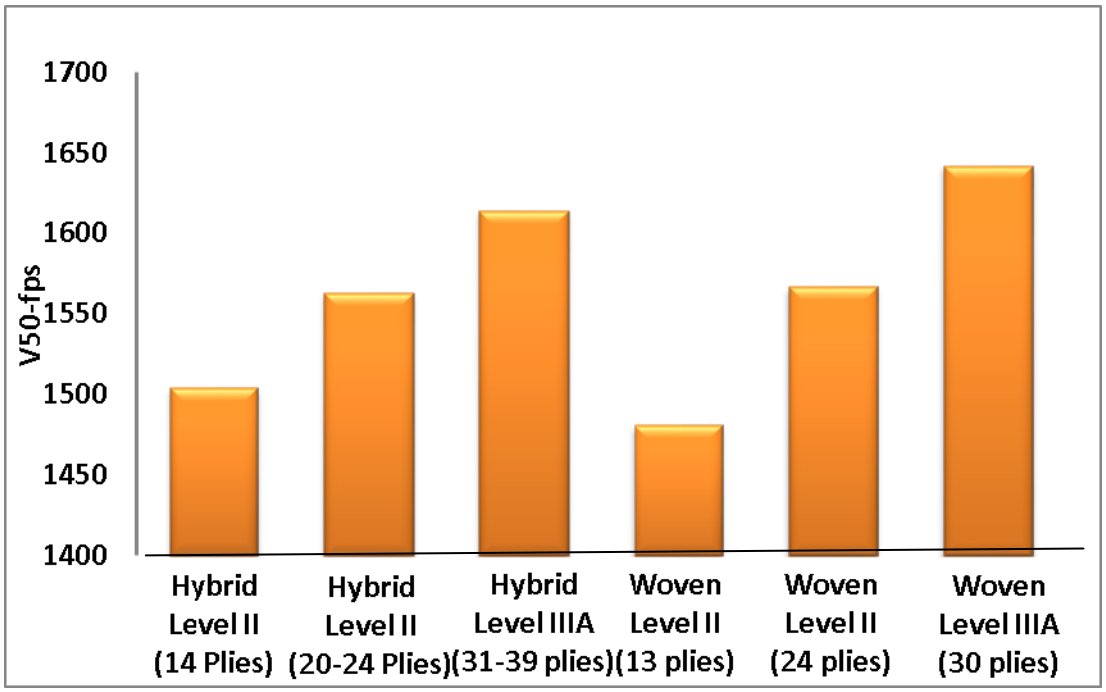

Figure 5. V50 ballistic limit for 5 year old Level II and Level IIIA soft body armor for hybrid and woven fabric armor panels tested in accordance with NIJ 0101.04.

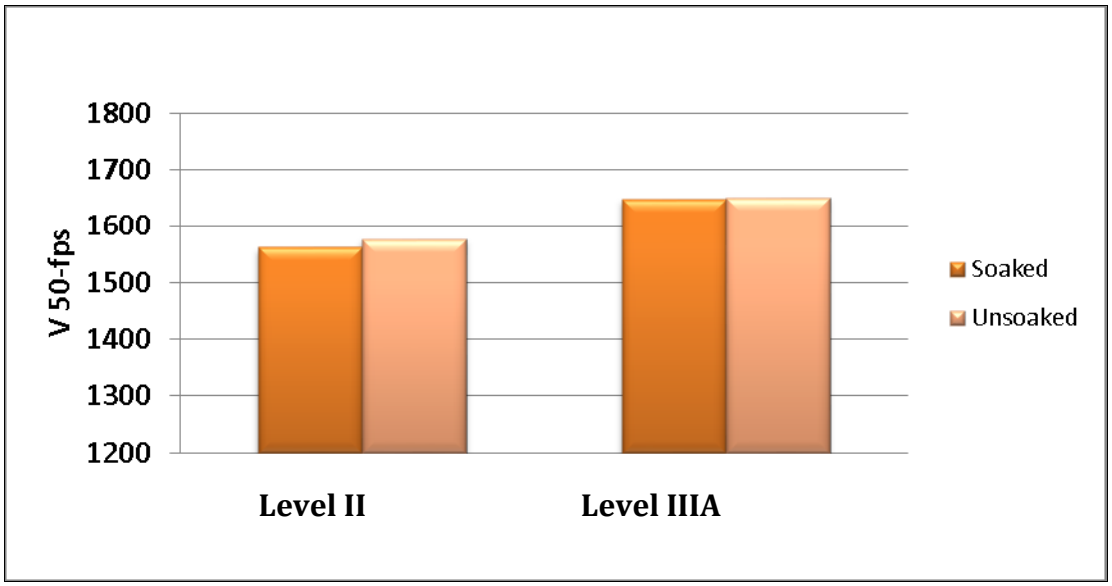

Figure 6. V50 ballistic limit for 5 year old level II and Level IIIA soft body armor that had been "soaked" in water or sweat previous to testing versus those that had not been soaked in water or sweat previous to testing and tested in accordance with NIJ 0101.04.

There is clearly no difference between the V50 ballistic limit for the vests that had been soaked in water or sweat at one point in time prior to testing and the vests that had not been reported soaked in water or sweat previous to testing. **This does NOT imply that there would be no difference between vests that are tested in a wet or dry condition, because that is clearly inaccurate**. No correlation could be made between the effects of maintenance of the vests and the ballistic resistance of the para-aramid woven fabric or Hybrid para-aramid/Polyethylene vests. However, a recent study did look at the degradation of PBO (Zylon®) fiber due to folding. This study indicated that there was a reduction of up to 41 percent in the ultimate tensile strength and strain to failure of the fibers (Holmes et al., 2010).

This study did not address the effect of different models of armor at a given protection level against one another. If the model types were taken into account, then a much better picture could be seen in the difference in V50 between new and used vests (see Figure 7). The 10 percent difference seen between new and used Level II vests in the current study could be traced to that of a given vest model (i.e., MON-II 107121) in Figure 7. Any real difference between new and used armor would be seen if there is more than a 100 t/s drop in the V50 limit. However, this only exists for two data points, meaning it may be significant.

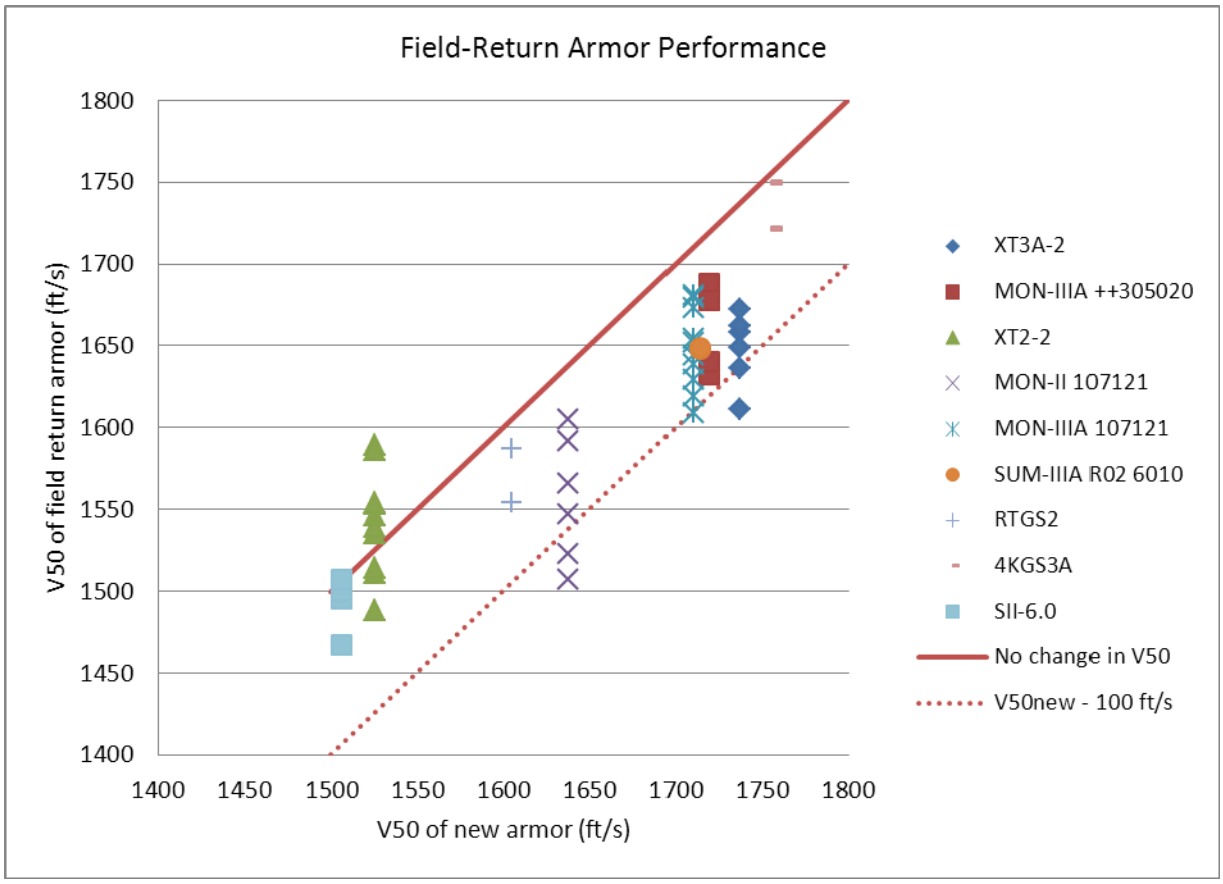

Figure 7. Comparison of Field-Return V50s to New Armor V50s. Solid red line indicates no difference in V50 performance. Dotted red line indicates a drop of 100 ft/s in V50 performance, which may be significant. (NIJ Special Report August 2005, www.ojp.usdoj.gov/)

There was no difference in backface deformation between the new and five year old vests, probably because there is such a large variation in the measurements for any one test. Therefore, any analysis had to be discontinued.

ii. Fiber Testing

The summary data in Tables G-3 and G-4 (in **Appendix G)** were used to calculate the specific strain energy stored in the fiber and the wave speed in the fiber (the raw vest-by-vest data is in Tables G-5, G-6, and G-7). Although an attempt

was made to look at any differences seen in fibers from Level II or Level IIIA vests, none could be seen. The specific strain energy, wave speed and BPP for fiber extracted from the new vests were: 51 ± 8.23 J/kg, 8.54 ± 0.33 m/s and 756 ± 46 m/s, respectively, while those for fiber extracted from the five year old vests were: 47.5 ± 6.2 J/kg, 8.35 ± 0.375 m/s and 733 ± 37 m/s, respectively. Statistically, there is no difference between the BPP for fiber extracted from new and old vests, and there is only a very small reduction in the mean or average values for the fiber extracted from the old vests over fiber extracted from the new vests (i.e., at most six percent in the specific strain energy, two percent in the wave speed and three percent in the BPP).

A graphical technique used by McDonough et. al. (2010) was employed in this analysis to compare the specific strain energy, wave speed and BPP of the new and five year old Kevlar fibers with other high performance fibers and Kevlar 29 and 49 as previously measured. **Figure 8** is a plot of the specific strain energy versus the wave speed for these fibers. As can be seen in this plot, the fibers in the current study tend to be higher than Kevlar 29 and 49 fibers previously tested.

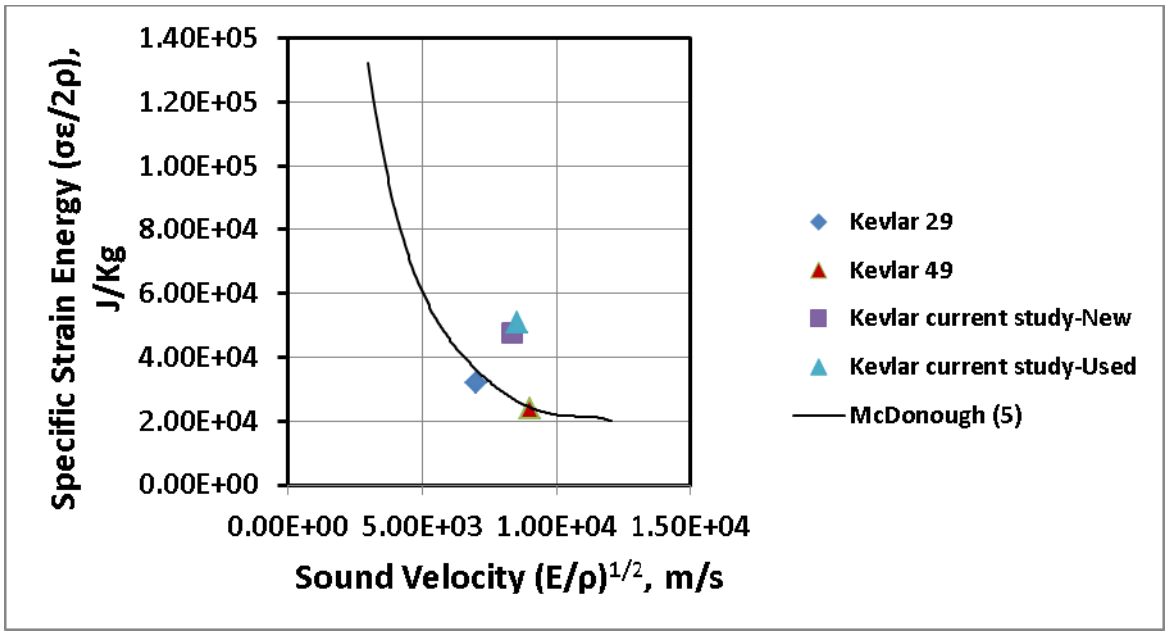

Figure 8. Specific strain energy vs. sound velocity of Kevlar fibers extracted from the five year old soft armor vests. The solid line is for other high performance fibers, as well as, Kevlar 29 and 49 from McDonough, et al. (2010) and for Kevlar from new vests and five year old vests in the current study.

Summary of Key Findings

The results of the ballistic testing revealed a possible reduction in the V50 performance level of the used Level II and IIIA body armor of approximately 10 percent when compared to new armor.[70] Put simply, the velocity at which 50 percent of the bullets penetrate the armor is less with the used armor. Importantly, this reduction did not vary by region. The vests performed equally regardless of the temperature/humidity in the climate in which they were reported worn by the officer. This suggests that environmental factors did not play a role in the performance differences between new and old vests.

[70] As noted above, strong conclusions from this data should be avoided given that they involved comparisons of vests of different models.

Backface deformations are another important determinant of armor performance because they measure the size of the indention in the backing material caused by a shot that did not completely penetrate the body armor. Although the armor is not fully penetrated by the bullet, significant harm or trauma to the officer can result. No significant differences were found between used and new vests with respect to backface deformations.

The results of the fiber testing indicated that the Ballistic Performance Parameter (function of elastic strain energy and sound velocity in the fiber) was relatively unchanged when looking at fibers from new vests or five year old vests. Thus, the ability of the armor to "catch" the bullet and diffuse its energy as heat did not appear to be different between the new and used sampled vests.

The officer interview data did not demonstrate any meaningful differences in body armor performance. Specifically, the vests that were reported soaked in sweat or water did not perform differently on any of the study tests (V50, backface deformation, or fiber analysis). However, one should interpret these results with caution given the very exploratory nature of the study, and small sample size used[71] (30 vests may not have been sufficient to detect important differences between officer care and maintenance practices, armor exposure to moisture or other trauma and overall body armor degradation). Moreover, the study had to rely on officer recollection of their experiences with the armor over the course of its use, and thus could be subject to some response bias.

[71] The researchers recognized at the outset that a small sample of 30 vests would challenge the ability to detect important statistical differences; however, this size was all that was possible within the established project parameters.

The apparent reduction in V50 seen in the current ballistic tests between new and used armor may only be a result of the model-to-model variations seen within each armor level.

DISCUSSION

There is no dispute about the importance of body armor in saving officer lives. And there is a growing awareness in the field that body armor safety and performance can be impacted by a combination of environmental factors (e.g., armor exposure to heat and moisture over time), and the ongoing care and maintenance practices of the officer (e.g., not folding or storing on a regular clothes hanger). Despite this, there have been no studies to date examining officer self-reported attitudes and behavior related to the use and care of their body armor or its connection to the overall performance degradation of the armor. This study was designed to begin the process of researching those topics.

This section reviews our findings from: 1) a national survey of sworn officers from randomly selected agencies about their practices in using and caring for body armor, conducted from October 2010 to May 2011; and 2) exploratory research on the impact of environmental and officer body armor care and maintenance on body armor performance.

Prevalence of Written Body Armor Policies Nationally and Their Enforcement

The survey conducted for this project is not directly comparable to the PERF/BJA survey of 2009, because it was designed to be a representative sample of law enforcement *officers*, as opposed to the 2009 survey of law enforcement *agencies*. However, the new survey does appear to offer strong evidence that "mandatory-wear" policies are becoming more prevalent.

Specifically, the new survey of more than 1,000 officers from all ranks, chosen to reflect a nationally representative sample of municipal, county, and state agencies, found that more than 92 percent of officers reported that they are required to wear body armor, either "at all times when on duty" (57%) or "at most times when on duty" (35.3%).

By contrast, the survey completed in 2009 found that only 59 percent of the responding agencies required their officers to wear body armor at least some of the time they were on duty.

Similarly, the 2011 survey found that 77.9 percent of officers reported that their agency has a written body armor policy. By contrast, the 2009 survey found that only 45 percent of the responding agencies indicated that they had a written policy requiring their officers to wear body armor.

These findings, showing increases in "mandatory wear" requirements and in written policies, are perhaps the most significant information obtained through the new survey, because requiring officers to wear body armor has direct implications for officers' safety. As it happened, the PERF survey described in this report was conducted shortly after Attorney General Eric Holder announced that the Justice Department's Bureau of Justice Assistance (BJA) would begin requiring jurisdictions to have a written "mandatory wear" policy in effect if they wished to obtain federal funding for body armor through BJA's Bulletproof Vest Partnership (BVP) program.[72] The Justice

[72] The Attorney General first announced the new requirements, which applied to FY 2011 BVP grants, in October 2010. Details are available at http://www.ojp.usdoj.gov/bvpbasi/docs/FAQsBVPMandatoryWearPolicy.pdf and

Department cited an increase in officer deaths in firearms-related incidents in adopting this new requirement.

It is encouraging to note that fatal shootings of officers declined sharply in 2012.[73] According to the National Law Enforcement Officers Memorial Fund (NLEOMF), which keeps detailed statistics on officers who are killed in the line of duty, there were 49 fatal shootings of officers in 2009, 59 fatal shootings in 2010, and 70 fatal shootings in 2011.[74] But as of October 30, 2012, there were 36 fatal shootings in 2012, which is a 37-percent decrease compared to the 57 fatal shootings for the same January 1-October 30 period in 2011.[75]

For the most part, officers did not believe that failure to wear their body armor would result in significant disciplinary measure. Although only one percent of officers had ever been disciplined for a body armor related violation, 58.3 percent of the officers speculated that they would be verbally reprimanded for such a first violation. Only 20 percent (20.3%) of the officers felt that repeated violations would result in a suspension.

Policy Recommendations:

- **More agencies need to implement written body armor policy that is periodically enforced through inspections.** Although over 90 percent of officers felt that the patrol leadership was supportive of the wearing of body armor, only 29.6 percent of officers said that their agency conducted

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http://www.ojp.usdoj.gov/bvpbasi/. PERF began sending the survey to respondents in October 2010, and data collection continued until May 2011.

[73] Whether the BVP's "mandatory wear" requirement is a causal factor in the reduction in officer deaths warrants further inquiry.

[74] http://www.nleomf.org/facts/officer-fatalities-data/causes.html

[75] http://www.nleomf.org/facts/officer-fatalities-data/

inspections to ensure that they are wearing body armor, and just 9.3 percent for proper maintenance. Significantly, conducting inspections and the presence of written policy were most often cited as the reasons why officers believe their agencies are "very supportive" of body armor use.

- **Departments need to examine their body armor replacement policies and practices.** Department support for body armor use is clear in the fact that 91.8 percent of officers reported that their body armor was supplied to them by their agency. However, this support declined significantly after officers receive their body armor if they need to replace it prematurely. ***Over half (51.0%) of the officers stated that body armor is not available for immediate replacement***. Not only does this raise officer safety considerations, it can impact officer perceptions of the level of importance placed by the department on body armor use. Agencies might examine ways to work with vendors to develop a temporary replacement program and/or speeding replacement vests for officers who are waiting for their new armor.

Officer Use of Body Armor on Duty

As an officer-level survey, important data are provided related to officer attitudes towards body armor use. Here again, the results are promising. Almost all officers surveyed (98.1%) stated that they currently wear body armor, and 87.9 percent said they comply with policy "all of the time." When asked to estimate how many of the officers in their platoon also follows body armor policy, 68.7 percent

believed that all of their colleagues complied. Most of the remaining officers (27.9%) estimated that the compliance of their colleagues was between 76 and 99 percent.

The high prevalence of officer body armor use was mostly a result of their recognition of its critical role in their safety. Despite the fact that only 3.2 percent of officers reported that they had experienced shooting situations, 90.0 percent of officers indicated that safety was an important consideration in their decision to wear armor. Formal written agency policy was cited as important by almost half of the officers.

Policy Recommendations:

- **Educational and training initiatives could be helpful to ensure that officers continue to recognize the importance of proper body armor use to their safety.** While it is difficult for an agency to monitor officer use of body armor all the time, monitoring seems to be an important factor in compliance. Of the minority of officers that reported regular inspections of their body armor use, 34 percent (33.6%) said that they occurred very randomly (not necessarily annually). Although greater frequency of inspections is desirable, agencies want to ensure that officers continue to self-regulate their body armor use, independently of the level of its monitoring. Combined with the fact that most officers reported that they were not in a situation where their body armor was required for protection, agencies should ensure that their personnel do not become complacent about its use. Regular reinforcement of its importance could be helpful.

Officer Care and Maintenance of Their Body Armor

With respect to officer care and maintenance practices, there is both good and bad news. Most officers (between 89% and 99%) recognized that body armor is not designed to last indefinitely, that it cannot be relied upon to stop rifle bullets, that it should not be laundered with standard washing detergent, and that it should not be stored in the trunk of a car . However, nearly two-thirds of officers did not know that moisture can negatively impact body armor performance.

As noted previously, "laying body armor flat" is usually recommended as a best practice for storing body armor, to prevent folding and bunching up of the armor plates. Almost 58 percent reported storing their armor on a clothes hanger not specially designed for body armor. ***While this issue may vary according to the specific model and manufacturer of the body armor, individual agencies should check with their manufacturers to make sure their maintenance and care procedures are in alignment with those recommended by the manufacturers***.

Policy Recommendations:

- **Increased officer training is necessary related to proper body armor care and maintenance practices.** Although most officers indicated that some sort of body armor training was available, it typically came in the form of manufacturer-provided literature or materials. Moreover, 21.5 percent of officers said that they had never received any training at all. Given the important knowledge gaps cited, this is an area worthy of significant attention in the future.

- **Departments need to examine the body armor storage areas available to their personnel.** Although the importance of body armor is widely accepted, it is of less value if officers are forced to store it in less than optimal circumstances that may have a potential of decreasing its performance in the future. Officer self-reports in this survey suggest that this may be the case, particularly in the cramped storage lockers that may be common to urban and larger departments. New configurations of lockers or other storage facilities may be necessary.

Comfort Needs – The Next Generation of Body Armor

Most officers cited a need for "improved comfort" (84.8%), "improved fit" (72.6%), and "reduced weight" (63.9%) in developing the next generation of body armor. Improved fit of body armor for women was cited as a special need. It is likely then that many officers continue to find their body armor bulky and uncomfortable to wear (possibly requiring more coverage on shoulders, sides, midsection, and underarms), despite their recognition of its clear importance to safety.

Policy Recommendations:

- **Rank-and-file officers should be involved in decisions for body armor selection in future updates and feedback to the manufacturers, as well as greater attention to the fitting process.** Although more than half of the respondents were satisfied with the fit of their current body armor, they were more satisfied when both the manufacturer and policy agency representatives were involved in the process.

Body Armor Testing in Real Life Settings

The research team and NIJ recognize the exploratory nature of the body armor degradation component of this study. The limited sample size used in the study precludes the ability to make significant conclusions from the data; however, it may be interesting that temperature and humidity factors found in the earlier Zylon® studies did not become apparent in this research.

More specifically, performance differences were discovered between new and used vests. The velocity at which the body armor is able to prevent bullet penetration (V50 values) declined approximately 10 percent over time (when comparing new to old body armor). These results did not vary significantly by region of the country, which suggests that environmental conditions such as temperature and humidity did not play a role in performance degradation in this sample. Backface deformation and fiber testing did not reveal significant differences between the used and unused vests.

Since regional differences did not appear to offer an explanation for the performance degradation over time, it is possible that officer care and maintenance practices (or other unique incidents) might be playing a role, but that was not detected by the current small sample size. The small number of interviewees and the retrospective nature of the study (having officers try to remember all factors that could potentially have impacted their body armor over time) may have impacted our ability to identify physical and experiential variables contributing to this result. The BAE Vest Check program is the best known example of an ongoing

study to continually test and report body armor performance from the time of introduction through the full warranty period.

The Future: Suggestions for Future Research

This study demonstrates that important progress has been made by law enforcement agencies nationally related to their body armor practices. Substantially more agencies appear to be implementing written body armor policies, although greater attention should be paid towards the enforcement of these policies, as well as the ongoing education and training of officers related to the proper, use, care, and maintenance of their body armor. That said, it is encouraging, given the role of body armor in preventing officer deaths, that this study found its use to be almost universal among the sample (98.1%). Examination of available storage space for armor is a critical need, as well as reducing replacement time for new vests.

With respect to the national survey, over three-quarters of the officers selected to participate in the research submitted a completed survey. While this is a high response rate, one has to consider that there could be a difference between the officers who choose to complete a survey on body armor and those who do not (e.g., the respondents in this survey could themselves be more likely to wear body armor and exhibit good care and maintenance practices). And it is possible that officer responses were positively biased toward sound body armor practices, given that most agencies have mandatory wear policies in place, although the confidential nature of the survey makes it unlikely that respondents would feel a need to paint a falsely positive portrayal of their body armor use practices.

One must interpret these results (including where no differences were found) with caution, given the limited sample of 30 used and 15 new vests. More research is needed that increases the sample size and prospectively tracks body armor exposure to real-life events and conditions over time. This will provide a greater understanding of officer safety considerations associated with officers' use, care and maintenance of body armor than a total reliance upon artificial conditioning studies in laboratories to determine the reasons for varying performance. Although more costly, such a longitudinal approach could advance our understanding of both body armor use and performance and larger questions related to officer safety. Future research should also have sample sizes large enough to include body armor of female officers in the study.

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APPENDIX A

Strata and Counts for Agencies

Strata and Counts for Agencies.

Census Region	Department Type	Department Size	Population Count	Respondent Agency Count	Respondent Officer Count
Northeast	Police Department	Missing	65	0	0
		1 to 25	1965	2	3, 5
		26 to 50	411	2	7, 7
		51 to 99	178	2	7, 9
		100 to 499	127	2	13, 13
		500 or more	13	2	12, 22
	Sheriff's Department	Missing	1	0	0
		1 to 25	79	2	4, 4
		26 to 50	33	2	6, 6
		51 to 99	26	2	6, 9
		100 to 499	35	2	4, 12
		500 or more	3	1	21
	State Police	100 to 499	4	2	8, 15
		500 or more	5	2	19, 24
Midwest	Police Department	Missing	161	0	0
		1 to 25	3519	2	2, 5
		26 to 50	461	2	6, 7
		51 to 99	194	2	3, 8
		100 to 499	98	2	5, 10
		500 or more	16	1	12
	Sheriff's Department	1 to 25	757	2	4, 5
		26 to 50	144	2	5, 5
		51 to 99	77	2	9, 10
		100 to 499	68	3	15, 15, 24
		500 or more	6	1	12
	State Police	100 to 499	5	2	14, 17
		500 or more	7	2	20, 20
South	Police Department	Missing	108	0	0
		1 to 25	3180	2	5, 5
		26 to 50	419	3	6, 7, 7
		51 to 99	228	3	5, 7, 9
		100 to 499	190	2	14, 110
		500 or more	46	2	12, 21
	Sheriff's Department	1 to 25	804	2	3, 3
		26 to 50	244	2	1, 7
		51 to 99	138	2	2, 9
		100 to 499	179	1	11
		500 or more	26	2	19, 19
	State Police	500 or more	16	2	19, 20
West	Police Department	Missing	15	0	0
		1 to 25	835	2	4, 5

	26 to 50	179	2	7, 7
	51 to 99	134	3	9, 10, 14
	100 to 499	122	1	15
	500 or more	20	2	14, 23
Sheriff's Department	1 to 25	219	2	2, 5
	26 to 50	81	2	6, 7
	51 to 99	41	1	9
	100 to 499	51	3	14, 15, 15
	500 or more	17	2	24, 30
State Police	100 to 499	5	1	15
	500 or more	8	2	17, 23

APPENDIX B

Body Armor Survey

POLICE EXECUTIVE RESEARCH FORUM

OFFICER BODY ARMOR SURVEY

FUNDED BY THE NATIONAL INSTITUTE OF JUSTICE

ID NUMBER

The Police Executive Research Forum (PERF), with funding from the National Institute of Justice (NIJ), is conducting a survey of the Nation's law enforcement officers on the use of body armor. NIJ is the research arm of the Department of Justice (DOJ), and is also responsible for the testing and development of performance standards for body armor. NIJ has funded this project because there is little independent research on officer use, care, and maintenance of body armor. Also, the National Law Enforcement Officers Memorial Fund, whose mission it is to generate increased public support for the law enforcement profession by permanently recording and appropriately commemorating the service and sacrifice of law enforcement officers and to provide information that will help promote law enforcement safety, is recommending that officers complete this survey.

This is an important study. Results from this research will be used to help save the lives of officers. The current survey will obtain critical information pertaining to agency policies, the selection and acquisition of body armor, protective capabilities of armor, fit and comfort of body armor, training, care and maintenance of body armor, and the future of body armor. Your participation is vital to our goal of achieving as close to a 100 percent response rate as possible. Thus, although your participation is voluntary, our receipt of your completed survey is critical to the achievement of our goals. This is a CONFIDENTIAL survey, which means that none of your responses will ever be shared with your agency. All results will be presented in the aggregate so that no officer will be identified through his/her responses.

There are three ways to respond to this survey:

1. Internet: An electronic version of this questionnaire is located on the Internet at http://survey.policeforum.org/NIJbodyarmorsurvey.pdf. If you choose to complete the survey via the Internet, you will be prompted to enter the following information:

   USER NAME: bodyarmor
   PASSWORD: nijsurvey

   Without entering your agency's user name, password, and ID number (located in the box at the top right hand corner of this page), you will not be able to complete the survey online. The user name and password provide a secure location to submit your survey.

2. Fax the completed survey to the Police Executive Research Forum at (202) 466-7826.
3. Mail the completed survey using the enclosed self-addressed envelope:

Bruce Kubu, Senior Research Associate
Police Executive Research Forum
1120 Connecticut Avenue, NW, Suite 930
Washington, DC 20036

If you have any questions regarding this project, please feel free to contact Bruce Kubu at (202) 454-8308 or bkubu@policeforum.org. Thank you for your time and assistance.

POLICE EXECUTIVE RESEARCH FORUM

OFFICER BODY ARMOR SURVEY

FUNDED BY THE NATIONAL INSTITUTE OF JUSTICE

ID NUMBER

Demographics

1. **What is your current rank?**
   - ☐ Officer/Deputy/Trooper
   - ☐ Corporal
   - ☐ Sergeant
   - ☐ Lieutenant or above
   - ☐ Investigator/Detective
   - ☐ Other (please specify):

2. **How many years of sworn experience do you have in the field of law enforcement (excluding military law enforcement experience)?**
   - ☐ 0-5 years
   - ☐ 6-10 years
   - ☐ 11 or more years

3. **Are you...**
   - ☐ ...Female
   - ☐ ...Male

4. **Please mark the response that <u>best</u> describes your current duty assignment.**
   - ☐ Patrol/traffic
   - ☐ Investigations/Detective
   - ☐ Special assignments (e.g., narcotics, gang enforcement, etc.)
   - ☐ Tactical unit/SWAT
   - ☐ Other (please specify):

   4a. Which of the following best describes your position?
   - ☐ Line-level ☐ Supervisory-level ☐ Command-level

   4b. Are you *mainly* on the street, in the office, or an equal combination of the two?
   - ☐ Mainly street ☐ Mainly office ☐ Equal combination of street and office

5. **Please mark the one area that <u>best</u> describes your beat/sector/district AND the approximate population you serve. If you work in some other type of area (e.g., a combined suburban/rural area), mark "Other" and describe that area in the field provided. If you do not know the population estimate, please write "DK" in the appropriate field.**
   - ☐ Urban area ⇨ ☐☐☐,☐☐☐ Urban population
   - ☐ Suburban area ⇨ ☐☐☐,☐☐☐ Suburban population
   - ☐ Rural area ⇨ ☐☐☐,☐☐☐ Rural population
   - ☐ Other (please specify): ⇨ ☐☐☐,☐☐☐ Other type of population

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6. **Please indicate the start and end time for your current shift.**

Start time: ☐☐:☐☐ ☐ AM ☐ PM

End time: ☐☐:☐☐ ☐ AM ☐ PM

6a. Do you work a rotating shift schedule?

☐ No

☐ Yes

Body Armor Usage and Care

7. **Do you currently wear body armor?**

☐ No* ⇨ **If NO, please explain why you do not use body armor.**

***IF YOU DO NOT CURRENTLY USE BODY ARMOR (I.E., YOU MARKED "NO" FOR QUESTION 7), PLEASE STOP HERE AND RETURN THE SURVEY TO PERF. IF COMPLETING THE SURVEY ONLINE, SCROLL DOWN TO THE LAST PAGE AND HIT THE "SUBMIT" BUTTON.**

☐ Yes

8. **Why do you wear body armor? Please mark all that apply.**

☐ Critical for safety

☐ Worker's compensation issues

☐ Agency policy requires it

☐ Pressure from family members

☐ Other (please specify):

9. **In which of the following situations has your body armor *actually* protected you? Please mark all that apply.**

☐ Protection during shooting

☐ Protection in car accident

☐ Protection from knife or other edged weapon assault

☐ Protection from punch/kick or other blunt trauma

☐ Other (please specify):

☐ Not applicable --- I have never been in a situation where my body armor was required to protect me

10. How do you store your body armor after usage? Please mark all that apply.

- ☐ Lie it flat
- ☐ Fold it up
- ☐ Hang it up on standard hanger/hook
- ☐ Use specialized device/container to hold armor for storage
- ☐ Other (please specify):

11. Where do you generally store your body armor when you are not working? Please mark all that apply.

- ☐ Locker
- ☐ Gear bag
- ☐ In vehicle (interior)
- ☐ In vehicle (trunk)
- ☐ At home
- ☐ Other (please specify):

12. How do you clean your body armor carrier? Please mark all that apply.

- ☐ Soap and water
- ☐ Laundry detergent
- ☐ Professional cleaning
- ☐ Fabric deodorizer (e.g., Febreze)
- ☐ Other (please specify):

13. How supportive is patrol leadership (i.e., patrol command staff) with wearing body armor?

☐ Very supportive ☐ Somewhat supportive ☐ Somewhat unsupportive ☐ Very unsupportive

Please describe the ways in which patrol leadership is either supportive or unsupportive.

Agency Body Armor Policy

14. Does your agency have a written policy requiring you to wear body armor?

- ☐ No **[Skip to Question 21]**
- ☐ Yes ⇨ **If YES, please mark the statement that best describes your agency's body armor wear policy.**
  - ☐ I am required to wear body armor at all times when on duty (i.e., mandatory by policy at all times)
  - ☐ I am required to wear body armor at most times when on duty (i.e., mandatory by policy with exceptions)
  - ☐ I am not required to wear body armor at all times, but I am required to wear it under special circumstances (e.g., when serving a warrant)
  - ☐ Other (please specify):

15. What do you think is likely to happen to you if you do not wear body armor when required to do so (i.e., FIRST OFFENSE)? Please mark all that apply.

- ☐ Suspension
- ☐ Written reprimand
- ☐ Verbal reprimand
- ☐ Fine
- ☐ Sent to retrieve and wear body armor
- ☐ Termination
- ☐ Policy is not enforced
- ☐ Other (please specify):

16. What do you think is likely to happen to you if you do not wear body armor when required to do so and you have already had a first offense (i.e., SECOND OFFENSE)? Please mark all that apply.

- ☐ Suspension
- ☐ Written reprimand
- ☐ Verbal reprimand
- ☐ Fine
- ☐ Sent to retrieve and wear body armor
- ☐ Termination
- ☐ Policy is not enforced
- ☐ Other (please specify):

17. Have you ever received some form of discipline for a body armor policy violation?

- ☐ No
- ☐ Yes ⇨ **If YES, please describe the discipline you received.**

18. In your opinion, and based upon your experience, approximately what percentage of the officers in your platoon (i.e., those officers working with you on your shift or standard duty assignment) wear body armor when your agency's policy calls for them to do so?

- ☐ 0-10%
- ☐ 11-25%
- ☐ 26-50%
- ☐ 51-75%
- ☐ 76-99%
- ☐ 100%
- ☐ Don't know

19. Do you wear your body armor all the time when prescribed to do so?

☐ No ⇨ **If NO, under what sort of circumstances or situations would you opt not to wear your body armor?**

☐ Yes

20. How often do you wear body armor when prescribed to do so?

☐ At all times when required to do so
☐ Most of the time
☐ Sometimes
☐ Rarely
☐ Other (please specify):

Selection/Acquisition

21. Does your agency currently issue body armor OR is it up to the individual officer to purchase his/her own body armor?

Agency issues body armor

☐ No
☐ Yes

Officer purchases body armor

☐ No
☐ Yes ⇨ **If YES, what factors were deemed important in selecting your body armor? Please mark all that apply.**

☐ Protection level
☐ Warranty
☐ Price
☐ Comfort
☐ Other (please specify):
☐ Ability to defeat rounds from officer's weapon
☐ Confidence in brand
☐ Referrals
☐ Meets NIJ standard

22. When were you issued, or when did you purchase, your current body armor? If you are not sure, you may look for the date of manufacture on the inner ballistic panel label.

☐☐☐ / ☐☐☐☐

Month (e.g., JAN) **Year** (e.g., 2004)

23. Were you fitted (e.g., measuring tape or sizing template was used) for your body armor? Please mark only one response.

- ☐ No, I was given body armor that approximates my body size (e.g., small, medium, large, etc.)
- ☐ Yes, I was fitted by representatives from the manufacturer/supplier
- ☐ Yes, I was fitted by internal agency representatives
- ☐ Yes, I was fitted by both the manufacturer AND agency representatives

23a. If YES, did the fitting take place at the time of order?

- ☐ No
- ☐ Yes

23b. If YES, did an additional fitting occur upon delivery of body armor?

- ☐ No
- ☐ Yes

23c. If YES, has the fit ever been checked after you took delivery of your body armor?

- ☐ No
- ☐ Yes

24. How satisfied are you with the current fit of your body armor?

- ☐ Very dissatisfied
- ☐ More dissatisfied than satisfied
- ☐ Neither dissatisfied nor satisfied
- ☐ More satisfied than dissatisfied
- ☐ Very satisfied

25. Have you ever had to replace your body armor prior to its manufacture warranty expiration date?

- ☐ No
- ☐ Yes ⇨ **If YES, for what reason was your body armor replaced prior to its expiration date?**

Protection/Protective Capabilities

26. What level of body armor do you wear? If you are unsure, you may check the inner ballistic panel label for this information.

- ☐ Level I
- ☐ Level IIA
- ☐ Level II
- ☐ Level IIIA
- ☐ Level III
- ☐ Level IV
- ☐ Don't know

27. Please mark all of the following that you believe are TRUE concerning body armor.

- ☐ My body armor can stop rifle bullets
- ☐ Moisture reduces the ballistic protection of body armor
- ☐ The proper way to store body armor is to hang it up on a hanger
- ☐ Body armor is designed to last indefinitely
- ☐ It is acceptable to store body armor in the trunk of a car
- ☐ Body armor should be replaced if penetrated by a bullet
- ☐ Body armor should be cleaned thoroughly with standard laundry detergent and washing machine
- ☐ None of the above statements are true concerning body armor

28. Do you utilize trauma/ballistic plates with your body armor?

- ☐ No
- ☐ Yes ⇨ **If YES:** ☐ Front panel only ☐ Back panel only ☐ Both front and back panels

29. Do you utilize an internal or external body armor carrier?

- ☐ Internal (i.e., officer wears body armor under uniform shirt)
- ☐ External (i.e., officer wears body armor over uniform shirt)
- ☐ Both an internal and external carrier

Maintenance, Training, and Inspection

30. How were you educated/trained on the benefits and limitations of wearing body armor, and on body armor care and maintenance? Please mark all that apply.

	Benefits and limitations of body armor	Body armor care and maintenance
Manufacturer-provided literature/manuals	☐	☐
Department-provided literature/manuals	☐	☐
Supervisory staff	☐	☐
Manufacturer/supplier representative	☐	☐
In-service/specialized training	☐	☐
Academy	☐	☐
Firearms training	☐	☐
Roll call	☐	☐
Other, please specify:	☐	☐
NONE WAS PROVIDED	☐	☐

31a. Does your agency conduct inspections to ensure that...

...you are wearing your body armor?

- ☐ No
- ☐ Yes ⇨ **If YES, how frequently are you inspected with regard to wearing your body armor?**
  - ☐ Monthly or more frequently
  - ☐ Multiple times per year, but less frequently than monthly
  - ☐ Once per year
  - ☐ Every two years
  - ☐ Vests are inspected, but inspections occur randomly and may or may not occur in a given year

⇨ **If YES, who most frequently conducts your body armor wear inspections?**

- ☐ First-line supervisor
- ☐ Commander
- ☐ Chief/Sheriff
- ☐ Risk management
- ☐ Other (please specify):

31b. Does your agency conduct inspections to ensure that...

...your body armor is maintained properly?

- ☐ No
- ☐ Yes ⇨ **If YES, how frequently is your body armor inspected with regard to maintenance?**
  - ☐ Monthly or more frequently
  - ☐ Multiple times per year, but less frequently than monthly
  - ☐ Once per year
  - ☐ Every two years
  - ☐ Vests are inspected, but inspections occur randomly and may or may not occur in a given year

⇨ **If YES, who most frequently conducts your body armor maintenance inspections?**

- ☐ First-line supervisor
- ☐ Commander
- ☐ Chief/Sheriff
- ☐ Risk management
- ☐ Other (please specify):

32. If your body armor is deemed to be either damaged or otherwise in need of replacement, is replacement body armor immediately available (i.e., not subject to ordering from the manufacturer with the associated delay)?

- ☐ No
- ☐ Yes, from my agency
- ☐ Yes, from the body armor vendor

Next Generation of Body Armor

33. Which of the following features would you like to see added to the next generation of body armor? Please mark all that apply.

- ☐ Integral spot on vest to affix badge, weapons, police radio microphone, and/or other equipment
- ☐ Improved access to weapons and utility belt
- ☐ Improved comfort (e.g., breathability, cooler, etc.)
- ☐ Improved breakaway components
- ☐ Improved durability
- ☐ Improved fit
- ☐ Fire resistant material
- ☐ Improved protection
- ☐ Integral drag strap for removing injured officers
- ☐ Reduced weight
- ☐ Modular design allowing for add-on protection when needed (e.g., neck, shoulders, groin)
- ☐ Other (please specify):

34. Please describe any additional changes or recommendations you have for the next generation of body armor, its use, care, maintenance, or development. Also, feel free to use this space to provide any additional comments that you would like to provide about any topic concerning body armor.

Thank you for your assistance with this important survey.

APPENDIX C

Body Armor Interview Instrument

POLICE EXECUTIVE RESEARCH FORUM

OFFICER BODY ARMOR INTERVIEW

FUNDED BY THE NATIONAL INSTITUTE OF JUSTICE

ID NUMBER

The Police Executive Research Forum (PERF), with funding from the National Institute of Justice (NIJ), is conducting a project to examine law enforcement officers' use, care, and maintenance of body armor. NIJ is the research arm of the Department of Justice (DOJ), and is also responsible for the testing and development of performance standards for body armor. NIJ has funded this project because there is little independent research on officer use, care, and maintenance of body armor. Also, the National Law Enforcement Officers Memorial Fund, whose mission it is to generate increased public support for the law enforcement profession by permanently recording and appropriately commemorating the service and sacrifice of law enforcement officers and to provide information that will help promote law enforcement safety, is recommending that officers complete this interview.

This is an important study. Results from this research will be used to help save the lives of officers. The current interview will capture information pertaining to your experiences with the body armor that was donated to PERF for testing. Your participation is vital to our goal of achieving as close to a 100 percent response rate as possible. Thus, although your participation is voluntary, your responses to the interview are critical to this achievement. This is a CONFIDENTIAL interview, which means that none of your responses will ever be shared with your agency. All results will be presented in the aggregate so that no officer will be identified through his/her responses.

If you have any questions regarding this project, please feel free to contact Bruce Kubu from PERF at (202) 454-8308 or bkubu@policeforum.org or Debra Stoe from NIJ at (202) 616-7036 or Debra.Stoe@usdoj.gov. Thank you for your time and assistance.

Respondent Contact Information:

(This information is being recorded only in the event that we need to contact you again to clarify a response. Once we are done with the interview, your identifying information will be deleted so you can not be linked to your responses.)

AGENCY

TITLE

LAST NAME

FIRST NAME

TELEPHONE ( ) - EXT.

E-MAIL ADDRESS

POLICE EXECUTIVE RESEARCH FORUM

OFFICER BODY ARMOR INTERVIEW

FUNDED BY THE NATIONAL INSTITUTE OF JUSTICE

ID NUMBER

Demographics

1. **Officer's gender:**
   - ☐ Female
   - ☐ Male

2. **What is your current rank?**
   - ☐ Officer/Deputy/Trooper
   - ☐ Corporal
   - ☐ Sergeant
   - ☐ Lieutenant or above
   - ☐ Investigator/Detective
   - ☐ Other (please specify):

3. **How many years of sworn experience do you have in the field of law enforcement (excluding military law enforcement experience)?**
   - ☐ 0-5 years
   - ☐ 6-10 years
   - ☐ 11 or more years

4. **On what date did you start using and stop using the body armor that was donated for testing? If you are unsure of the exact date, you may estimate, but please try to be as accurate as possible with the month and year.**

   Start date: ☐☐ / ☐☐ / ☐☐☐☐ (MM/DD/YYYY) Mark here if this is an estimate: ☐

   End date: ☐☐ / ☐☐ / ☐☐☐☐ (MM/DD/YYYY) Mark here if this is an estimate: ☐

5. **Did you work a fixed or rotating shift during the period that you wore the body armor that was donated for testing?**
   - ☐ Fixed
   - ☐ Rotating (skip to Question 6)
   - ☐ Other (please specify):

   5a. Which shift did you work during the period that you wore the body armor that was donated for testing? If your shift varied over this period, please indicate your most common shift.

   Start time: ☐☐:☐☐ ☐ AM ☐ PM

   End time: ☐☐:☐☐ ☐ AM ☐ PM

   5b. Did your shift change during the period that you wore the body armor that was donated for testing?
   - ☐ No
   - ☐ Yes

6. **Which of the following best describes your duty assignment during the period you wore the body armor that was donated for testing?**
   - ☐ Patrol/traffic
   - ☐ Investigations/Detective
   - ☐ Special assignments (e.g., narcotics, gang enforcement, etc.)
   - ☐ Tactical unit/SWAT
   - ☐ Other (please specify):

   6a. Did your duty assignment change during the period that you wore the body armor that was donated for testing?
   - ☐ No
   - ☐ Yes

7. **Which of the following best describes your position during the period you wore the body armor that was donated for testing?**
   - ☐ Line-level ☐ Supervisory-level ☐ Command-level

8. **Were you *mainly* on the street, in the office, or an equal combination of the two?**
   - ☐ Mainly street ☐ Mainly office ☐ Equal combination of street and office

   8a. Did this change during the period that you wore the body armor that was donated for testing?
   - ☐ No
   - ☐ Yes

9. **What type of body armor did you wear (that was sent to PERF for testing)?**

   Threat level?
   - ☐ Level I
   - ☐ Level IIA
   - ☐ Level II
   - ☐ Level IIIA
   - ☐ Level III
   - ☐ Level IV
   - ☐ Other (please specify):

   Brand?
   - ☐ American Body Armor
   - ☐ Point Blank
   - ☐ Safariland
   - ☐ Second Chance
   - ☐ Protective Apparel Corporation of America (PACA)
   - ☐ US Armor
   - ☐ Other (please specify):

10. **Did your body armor use internal carriers, external carriers, or both?**
    - ☐ Internal (i.e., officer wears body armor under uniform shirt)
    - ☐ External (i.e., officer wears body armor over uniform shirt)
    - ☐ Both

11. **Using a seven-point scale, how well did your body armor fit? (1=Very poorly, 2=Poorly, 3=Somewhat poorly, 4=Neither poorly nor well, 5=Somewhat well, 6=Well, 7=Very well)**

Very poorly	Poorly	Somewhat poorly	Neither poorly nor well	Somewhat well	Well	Very well
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7

12. Was your body armor fitted? Please mark only one response.

- ☐ No, I received body armor that approximated my body size (e.g., small, medium, large, etc.)
- ☐ Yes, I was fitted by representatives from the manufacturer/supplier
- ☐ Yes, I was fitted by internal agency representatives
- ☐ Yes, I was fitted by manufacturer AND agency representatives

12a. If YES, did a fitting take place at time of order?

- ☐ No
- ☐ Yes ⇨ **If YES, did an additional fitting occur upon delivery of your body armor?**
  - ☐ No
  - ☐ Yes
  - ☐ Don't know
- ☐ Don't know

13. On what date did you receive the body armor that you provided for testing?

☐☐ / ☐☐ / ☐☐☐☐ (MM/DD/YYYY)

13a. How were you notified that your body armor was due to be replaced?

14. Was the armor new (unused) or used when you originally received it?

- ☐ New, unused
- ☐ Used

15. We now want to ask you some questions about the condition of your body armor that was provided for testing.

15a. Was it ever damaged (i.e., punctured, folded, etc.)?

- ☐ No
- ☐ Yes ⇨ **If "Yes," what was the nature of this damage?**

15b. Was there any visible wear/tear on the body armor (excluding the carrier)?

- ☐ No
- ☐ Yes ⇨ **If "Yes," what was the nature of this wear/tear?**

15c. Was your body armor ever exposed to water to the point where the carrier became saturated (i.e., in a pool, river, pond, or other body of water, or exposed to very heavy rain)?

- ☐ No
- ☐ Yes ⇨ **If "Yes," please describe the nature of this exposure and the number of times it occurred.**

15d. Was the body armor ever hit with a bullet?

☐ No

☐ Yes ⇨ If "Yes," please describe the caliber of the round that impacted your body armor and where it struck.

15e. Was the body armor ever cut or pierced with an edged weapon, such as a knife or shank?

☐ No

☐ Yes ⇨ If "Yes," please describe the nature of the cutting edged weapon damage and where it struck.

15f. Was the body armor ever exposed to extreme heat (e.g., stored in the trunk of a car or in an attic, or worn while responding to a fire emergency where you came in close proximity to extreme heat)?

☐ No

☐ Yes ⇨ If "Yes," please describe this heat exposure, including the duration of the heat exposure.

16. Was your body armor inspected to determine if it fit and/or was maintained properly?

☐ No [Skip to Question 18]

☐ Yes

16a. If YES, how often are body armor inspections conducted for fit and maintenance? Please mark one response for both "Fit" and "Maintenance".

	Fit	Maintenance
About once a week	☐	☐
A few times a month	☐	☐
About once a month	☐	☐
About once every 3 months	☐	☐
About once every 6 months	☐	☐
About once a year	☐	☐
Less than once a year	☐	☐
Other, please specify:	☐	☐

17. Who most frequently conducted your body armor inspections within your agency?

- ☐ Firstline supervisor
- ☐ Commander
- ☐ Chief/Sheriff
- ☐ Risk management
- ☐ Other (please specify):

History of the Officer's Body Armor

Officers will be asked to chronicle their experiences with their body armor over the period of time during which they were assigned the body armor that was submitted for testing.

18. Physical factors related to the body armor that was provided for testing.

Care and maintenance of your body armor

18a. Was your body armor cleaned periodically?

- ☐ No
- ☐ Yes ⇨ **If "Yes," how frequently did you clean your body armor?**

⇨ **If "Yes," how did you clean your body armor (i.e., with what types of cleansers, methods, etc.)?**

⇨ **If "Yes," did you ever use detergents/soap (specify types) and water (temperature) to clean your body armor?**

- ☐ No
- ☐ Yes

⇨ **If "Yes," did you ever use a professional cleaning service? If "Yes," please describe.**

- ☐ No
- ☐ Yes

18b. Aside from cleaning, what other maintenance techniques were used with your body armor (e.g., laying your body armor out flat to dry)?

18c. Did you receive training on the care and maintenance of your body armor?

☐ No

☐ Yes ⇨ If "Yes," who provided the training? Please mark all that apply.

	Body armor care and maintenance
Manufacturer-provided literature/manuals	☐
Department-provided literature/manuals	☐
Supervisory staff	☐
Manufacturer/supplier representative	☐
In-service/specialized training	☐
Academy	☐
Firearms training	☐
Roll call	☐
Other, please specify:	☐

⇨ If "Yes," what was the scope of the training?

⇨ If "Yes," did the training you received cover how and where to store your body armor?

☐ No

☐ Yes

Storage conditions for body armor between usages

18d. How did you typically store your body armor between usage? Please mark all that apply.

- ☐ Hang up
- ☐ Lay out flat
- ☐ Fold it
- ☐ Haphazard storage
- ☐ Other (please specify):

Other comments on storage method:

18e. Where did you typically store your body armor between usage? Please mark all that apply.

- ☐ In locker
- ☐ In car
- ☐ In closet at work
- ☐ In closet at home
- ☐ On the floor
- ☐ Other (please specify):

Other comments on storage location:

Body armor use

18f. Does your agency have a written policy requiring you to wear body armor?

- ☐ No **[Skip to Question 18j]**
- ☐ Yes ⇨ **If YES, please mark the statement that best describes your agency's body armor wear policy.**
  - ☐ I am required to wear body armor at all times when on duty (i.e., mandatory by policy at all times)
  - ☐ I am required to wear body armor at most times when on duty (i.e., mandatory by policy with exceptions)
  - ☐ I am not required to wear body armor at all times, but I am required to wear it under special circumstances (e.g., when serving a warrant)
  - ☐ Other (please specify):

18g. In your opinion, and based upon your experience, approximately what percentage of the officers in your platoon (i.e., those officers working with you on your shift or standard duty assignment) wear body armor when your agency's policy calls for them to do so?

- ☐ 0-10%
- ☐ 11-25%
- ☐ 26-50%
- ☐ 51-75%
- ☐ 76-99%
- ☐ 100%
- ☐ Don't know

18h. Do you wear your body armor all the time when prescribed to do so?

- ☐ No ⇨ **If NO, under what sort of circumstances or situations would you opt not to wear your body armor?**
- ☐ Yes

18i. How often do you wear body armor when prescribed to do so?

- ☐ At all times when required to do so
- ☐ Most of the time
- ☐ Sometimes
- ☐ Rarely
- ☐ Other (please specify):

18j. Why do you wear body armor? Please mark all that apply.

- ☐ Critical for safety
- ☐ Worker's compensation issues
- ☐ Agency policy requires it
- ☐ Pressure from family members
- ☐ Other (please specify):

18k. Were there any extended periods during the time you were in possession of your armor where it was not used, excluding normal leave periods?

- ☐ No
- ☐ Yes ⇨ **If "Yes," how frequently did these periods of non-use occur?**

⇨ **If "Yes," what was the reason(s) for these periods of non-use?**

⇨ **If "Yes," how was your body armor stored during these periods of non-use?**

18l. How frequently would you sweat into your body armor?

- ☐ Never
- ☐ Rarely
- ☐ Occasionally
- ☐ Frequently
- ☐ Everytime it was worn

18m. During a typical shift, approximately what percent of your shift would you wear your body armor?

☐☐☐ %

18n. How many days does your typical tour of duty last?

☐☐ **days**

18o. Was your body armor ever used by someone other than you during the time period that it was in your possession?

- ☐ No
- ☐ Yes ⇨ **If "Yes," under what circumstances did you loan your body armor to someone else?**

18p. How frequently did you wrestle or engage in ground fighting with suspects while wearing the body armor that was donated for testing?

- ☐ More than once a day
- ☐ Once a day
- ☐ Several times a week, but not daily
- ☐ Once per week
- ☐ Several times per month, but not weekly
- ☐ Once a month
- ☐ Several times a year, but not monthly
- ☐ Other (please specify):

18q. Were you ever involved in a car accident while on duty while you were wearing your body armor that was donated for testing?

- ☐ No
- ☐ Yes ⇨ **If "Yes," can you please explain a bit about what happened? We are specifically interested in how the body armor might have been impacted by the crash and/or if it helped you to avoid a more serious injury.**

18r. How frequently did you run or engage in other strenuous physical activities while wearing the body armor that was donated for testing?

- ☐ More than once a day
- ☐ Once a day
- ☐ Several times a week, but not daily
- ☐ Once per week
- ☐ Several times per month, but not weekly
- ☐ Once a month
- ☐ Several times a year, but not monthly
- ☐ Other (please specify):

19. Any other comments regarding the body that was donated for testing or other comments about the project generally?

APPENDIX D

Armor Protection Levels

Armor Level	Protection
Type I (.22 LR;.380 ACP)	This armor would protect against 2.6 g (40 gr) .22 Long Rifle Lead Round Nose (LR LRN) bullets at a velocity of 329 m/s (1080 ft/s ± 30 ft/s) and 6.2 g (95 gr) .380 ACP Full Metal Jacketed Round Nose (FMJ RN) bullets at a velocity of 322 m/s (1055 ft/s ± 30 ft/s). It is no longer part of the standard.
Type IIA (9 mm;.40 S&W;.45 ACP)	This armor protects against 9 mm Full Metal Jacketed Round Nose (FMJ RN) bullets, with nominal masses of 8.0 g (124 gr) impacting at a minimum velocity of 332 m/s (1090 ft/s) or less, and 40 S&W caliber Full Metal Jacketed (FMJ) bullets, with nominal masses of 11.7 g (180 gr) impacting at a minimum velocity of 312 m/s (1025 ft/s) or less. It also provides protection against the threats mentioned in [Type I].
Type II (9 mm;.357 Magnum)	This armor protects against 9 mm Full Metal Jacketed Round Nose (FMJ RN) bullets, with nominal masses of 8.0 g (124 gr) impacting at a minimum velocity of 358 m/s (1175 ft/s) or less, and 357 Magnum Jacketed Soft Point (JSP) bullets, with nominal masses of 10.2 g (158 gr) impacting at a minimum velocity of 427 m/s (1400 ft/s) or less. It also provides protection against the threats mentioned in [Types I and IIA].
Type IIIA (.357 SIG; .44 Magnum)	This armor protects against 7.62 mm Full Metal Jacketed (FMJ) bullets (U.S. Military designation M80), with nominal masses of 9.6 g (148 gr) impacting at a minimum velocity of 838 m/s (2750 ft/s) or less. It also provides protection against most handgun threats, as well as the threats mentioned in [Types I, IIA, and II].
Type III (Rifles)	Conditioned armor protects against 9.6 g (148 gr) 7.62x51mm NATO M80 ball bullets at a velocity of 847 m/s ± 9.1 m/s (2780 ft/s ± 30 ft/s). It also provides protection against the threats mentioned in [Types I, IIA, II, and IIIA].
Type IV	This armor protects against .30 caliber armor piercing (AP) bullets (U.S.

(Armor Piercing Rifle)	Military designation M2 AP), with nominal masses of 10.8 g (166 gr) impacting at a minimum velocity of 869 m/s (2850 ft/s) or less. It also provides at least single hit protection against the threats mentioned in [Types I, IIA, II, IIIA, and III].

Source: National Institute of Justice. "Ballistic Resistance of Body Armor NIJ Standard-0101.04" (2000). Page 2.
https://www.ncjrs.gov/pdffiles1/nij/183651.pdf

APPENDIX E

Crosstab Analyses

I. Population Density

Q8. Why do you wear body armor?	Other	Rural	Suburban	Urban
Critical for Safety**	93% (N=105)	94% (N=107)	95% (N=236)	87% (N=553)
Workers compensation issues**	6% (N=104)	19% (N=106)	17% (N=237)	9% (N=554)
Agency policy requires it**	54% (N=105)	53% (N=106)	59% (N=237)	45% (N=554)
Family Pressure†	21% (N=104)	19% (N=106)	15% (N=237)	13% (N=554)

† = .10 * =- .05 ** = .01

Q9. In which of the following situations has your body armor actually protected you?	Other	Rural	Suburban	Urban
Protection during shooting	1% (N=105)	2% (N=107)	3% (N=237)	5% (N=554)
Protection in car accident†	11% (N=104)	5% (N=106)	11% (N=237)	7% (N=554)
Protection from knife or other edged weapon assault**	0% (n=104)	6% (N=106)	4% (N=236)	1% (N=554)
Protection from punch/kick or other blunt trauma**	19% (N=105)	23% (N=107)	36% (N=237)	13% (N=554)
Other (specify)	1% (N=105)	1% (N=106)	0% (N=236)	1% (N=553)
N/A**	71% (N=104)	71% (N=107)	57% (N=237)	79% (N=554)

† = .10 * =- .05 ** = .01

Q27. Please mark all of the following that you believe are TRUE concerning body armor	Other	Rural	Suburban	Urban
Can stop rifle bullets	3% (N=103)	2% (N=105)	5% (N=233)	2% (N=531)
Moisture reduces the ballistic protection*	49% (N=103)	37% (N=105)	37% (N=233)	34% (N=531)
Proper way to store is on hanger	29% (N=103)	28% (N=106)	26% (N=232)	31% (N=531)
Is designed to last indefinitely	1% (N=103)	1% (N=105)	0% (N=233)	1% (N=531)
Can store in the trunk of a car*	11% (N=103)	14% (N=105)	14% (N=232)	8% (N=531)
Should be replaced if penetrated by a bullet	98% (N=103)	94% (N=105)	95% (N=233)	95% (N=531)
Should be cleaned thoroughly with standard laundry**	18% (N=103)	6% (N=105)	6% (N=233)	9% (N=531)

† = .10 * =- .05 ** = .01

Q10. How do you store your body armor after usage?	Other	Rural	Suburban	Urban
Flat**	37% (N=104)	47% (N=107)	52% (N=244)	35% (N=554)
Fold it up†	3% (N=105)	2% (N=107)	1% (N=245)	0% (N=554)
Hang it on standard hanger/hook**	47% (N=105)	50% (N=106)	47% (N=244)	64% (N=554)
Specialized device/container	0% (N=105)	1% (N=107)	3% (N=244)	1% (N=554)

† = .10 * =- .05 ** = .01

Q14a. Does your agency have a written policy requiring you to wear body armor?	Other	Rural	Suburban	Urban
Yes†	72% (N=103)	70% (N=106)	81% (N=244)	79% (N=551)

† = .10 * =- .05 ** = .01

Q14b. Please mark the statement that best describes your agency's body armor wear policy***	Other	Rural	Suburban	Urban
I am required to wear body armor at all times when on duty	46.5% (N=33)	72.2% (N=52)	63.1% (N=118)	50.6% (N=212)
I am required to wear body armor at most times when on duty	32.4% (N=23)	18.1% (N=13)	26.2% (N=49)	45.6% (N=191)
I am not required to wear body armor at all times, but I am required to wear it under special	12.7% (N=9)	6.9% (N=5)	3.2% (N=6)	1.9% (N=8)
Other	8.5% (N=6)	2.8% (N=2)	7.5% (N=14)	1.9% (N=8)

† = .10 * =- .05 ** = .01

Q20. How often do you wear body armor?	Other	Rural	Suburban	Urban
Rarely/sometimes	0% (N=60)	2% (N=65)	1% (N=181)	0% (N=322)
Most of the time	5% (N=60)	13% (N=65)	13% (N=181)	12% (N=322)
All of the time	95% (N=60)	85% (N=65)	86% (N=181)	88% (N=322)

† = .10 * =- .05 ** = .01

Q24. How satisfied are you with the fit of your body armor?**	Other	Rural	Suburban	Urban
Dissatisfied	34% (N=103)	32% (N=106)	28% (N=236)	27% (N=532)
Neutral	12% (N=103)	12% (N=106)	23% (N=236)	7% (N=532)
Satisfied	54% (N=103)	56% (N=106)	49% (N=236)	66% (N=532)

† = .10 * =- .05 ** = .01

Q23. Were you fitted for your body armor?	Other	Rural	Suburban	Urban
No, I was given body armor that approximates my body size	5% (N=103)	8% (N=105)	6% (N=236)	5% (N=532)
Yes, I was fitted by representatives from the manufacturer	76% (N=103)	72% (N=105)	72% (N=236)	69% (N=532)
Yes, I was fitted by internal agency representatives	16% (N=103)	19% (N=105)	17% (N=236)	19% (N=532)
Yes, I was fitted by both the manufacturer AND agency representatives	3% (N=103)	1% (N=105)	5% (N=236)	7% (N=532)

† = .10 * =- .05 ** = .01

Q31a. Does your agency conduct inspections to ensure that you are wearing your body armor?	Other	Rural	Suburban	Urban
Yes†	27% (N=100)	18% (N=106)	31% (N=232)	31% (N=531)

† = .10 * =- .05 ** = .01

Q31b. Does your agency conduct inspections to ensure that your body armor is maintained properly?	Other	Rural	Suburban	Urban
Yes**	27% (N=100)	7% (N=105)	7% (N=237)	8% (N=531)

† = .10 * =- .05 ** = .01

Q30. How were you educated/trained on the benefits and limitations of wearing body armor, and on care and maintenance?	Other	Rural	Suburban	Urban
Manufacturer-provided literature/manuals -Benefits and limitations*	61% (N=102)	43% (N=104)	53% (N=234)	57% (N=526)
Department-provided literature/manuals Benefits and limitations**	30% (N=102)	9% (N=105)	9% (N=234)	14% (N=527)
Supervisory staff -Benefits and limitations**	25% (N=102)	10% (N=105)	11% (N=234)	11% (N=527)
Manufacturer/supplier representative -Benefits and limitations	20% (N=102)	19% (N=105)	17% (N=235)	15% (N=526)
In-service/specialized training -Benefits and limitations**	22% (N=102)	9% (N=105)	8% (N=235)	10% (N=527)
Academy -Benefits and limitations*	42% (N=102)	40% (N=105)	35% (N=234)	30% (N=526)
Firearms Training -Benefits and limitations†	33% (N=102)	18% (N=104)	24% (N=235)	22% (N=527)
Roll Call -Benefits and limitations	7% (N=102)	2% (N=104)	4% (N=234)	6% (N=526)
Other (specify) -Benefits and limitations	1% (N=102)	2% (N=105)	1% (N=234)	0% (N=527)
None was provided -Benefits and limitations	17% (N=102)	23% (N=105)	22% (N=234)	22% (N=526)
Manufacturer-provided literature/manuals-care and maintenance*	66% (N=102)	47% (N=105)	59% (N=234)	61% (N=526)
Department-provided literature/manuals care and maintenance	11% (N=102)	10% (N=105)	8% (N=234)	12% (N=527)
Supervisory staff - care and maintenance	11% (N=102)	6% (N=104)	7% (N=234)	7% (N=526)
Manufacturer/supplier representative -care and maintenance*	19% (N=102)	18% (N=105)	18% (N=234)	N=12% (N=527)

Q30 (cont'd). How were you educated/trained on the benefits and limitations of wearing body armor, and on care and maintenance?	Other	Rural	Suburban	Urban
In-service/specialized training - care and maintenance	5% (N=103)	3% (N=105)	6% (N=234)	5% (N=527)
Academy - care and maintenance	17% (N=102)	23% (N=105)	19% (N=234)	18% (N=527)
Firearms Training - care and maintenance**	7% (N=102)	5% (N=105)	14% (N=234)	6% (N=526)
Roll Call - care and maintenance	2% (N=102)	3% (N=105)	1% (N=235)	2% (N=526)
Other (specify) - care and maintenance*	4% (N=102)	1% (N=105)	1% (N=234)	0% (N=527)
None was provided - care and maintenance	25% (N=102)	33% (N=105)	29% (N=235)	17% (N=526)

† = .10 * =- .05 ** = .01

II. Department Size (number of sworn officers categorized)

Q8. Why do you wear body armor?	>25	26-50	51-99	100-499	500+
Critical for Safety**	85% (N=178)	94% (N=69)	97% (N=72)	95% (N=150)	89% (N=581)
Workers compensation issues*	16% (N=178)	16% (N=69)	15% (N=72)	11% (N=150)	8% (N=580)
Agency policy requires it**	65% (N=178)	48% (N=69)	68% (N=72)	48% (N=150)	43% (N=580)
Family Pressure*	12% (N=178)	24% (N=68)	22% (N=73)	14% (N=150)	13% (N=581)

† = .10 * =- .05 ** = .01

Q9. In which of the following situations has your body armor actually protected you?	>25	26-50	51-99	100-499	500+
Protection during shooting*	0% (N=178)	1% (N=69)	1% (N=72)	4% (N=150)	5% (N=580)
Protection in car accident*	6% (N=178)	12% (N=68)	8% (N=73)	14% (N=150)	7% (N=580)
Protection from knife or other edged weapon assault	4% (N=178)	1% (N=69)	0% (N=72)	3% (N=150)	1% (N=580)
Protection from punch/kick or other blunt trauma**	30% (N=178)	32% (N=69)	28% (N=72)	30% (N=150)	11% (N=580)
Other (specify)**	1% (N=178)	3% (N=69)	3% (N=73)	0% (N=150)	0% (N=580)
N/A**	65% (N=178)	59% (N=68)	70% (N=72)	61% (N=150)	81% (N=580)

† = .10 * =- .05 ** = .01

Q27. Please mark all of the following that you believe are TRUE concerning body armor	>25	26-50	51-99	100-499	500+
Can stop rifle bullets	1% (N=185)	5% (N=64)	0% (N=70)	5% (N=144)	3% (N=558)
Moisture reduces the ballistic protection	40% (N=185)	39% (N=64)	33% (N=70)	33% (N=143)	35% (N=558)
Proper way to store is on hanger	35% (N=185)	35% (N=63)	34% (N=71)	29% (N=143)	27% (N=558)
Is designed to last indefinitely	0% (N=185)	0% (N=64)	1% (N=71)	1% (N=143)	1% (N=559)
Can store in the trunk of a car**	18% (N=185)	13% (N=64)	9% (N=71)	13% (N=143)	8% (N=559)
Should be replaced if penetrated by a bullet†	94% (N=185)	100% (N=63)	96% (N=70)	92% (N=143)	96% (N=558)
Should be cleaned thoroughly with standard laundry†	7% (N=185)	11% (N=63)	11% (N=70)	15% (N=144)	8% (N=559)

† = .10 * =- .05 ** = .01

Q10. How do you store your body armor after usage?	>25	26-50	51-99	100-499	500+
Flat**	57% (N=185)	38% (N=69)	32% (N=72)	56% (N=151)	32% (N=580)
Fold it up	0% (N=185)	0% (N=69)	1% (N=73)	1% (N=151)	1% (N=580)
Hang it on standard hanger/hook**	39% (N=186)	59% (N=69)	63% (N=72)	44% (N=151)	65% (N=580)
Specialized device/container**	7% (N=185)	0% (N=68)	0% (N=72)	1% (N=151)	0% (N=580)

† = .10 * =- .05 ** = .01

Q14a. Does your agency have a written policy requiring you to wear body armor?	>25	26-50	51-99	100-499	500+
Yes*	84% (N=186)	71% (N=70)	85% (N=72)	79% (N=150)	76% (N=577)

† = .10 * =- .05 ** = .01

Q14b. Please mark the statement that best describes your agency's body armor wear policy***	>25	26-50	51-99	100-499	500+
I am required to wear body armor at all times when on duty	69.2% (N=99)	78.0% (N=39)	71.7% (N=43)	71.9% (N=82)	44.4% (N=187)
I am required to wear body armor at most times when on duty	24.5% (N=35)	20.0% (N=10)	20.0% (N=12)	16.7% (N=19)	48% (N=202)
I am not required to wear body armor at all times, but I am required to wear it under special	3.5% (N=5)	0.0% (N=0)	1.7% (N=1)	4.4% (N=5)	4.3% (N=18)
Other	2.8% (N=4)	2.0% (N=0)	6.7% (N=4)	7.0% (N=8)	3.3% (N=14)

† = .10 * =- .05 ** = .01

Q20. How often do you wear body armor?**	>25	26-50	51-99	100-499	500+
Rarely/sometimes	1% (N=150)	0% (N=39)	0% (N=53)	2% (N=100)	0% (N=327)
Most of the time	19% (N=150)	3% (N=39)	13% (N=53)	2% (N=100)	12% (N=327)
All of the time	81% (N=150)	97% (N=39)	87% (N=53)	95% (N=100)	88% (N=327)

† = .10 * =- .05 ** = .01

Q24. How satisfied are you with the fit of your body armor?**	>25	26-50	51-99	100-499	500+
Dissatisfied	38% (N=185)	29% (N=65)	26% (N=72)	17% (N=145)	29% (N=559)
Neutral	20% (N=185)	12% (N=65)	15% (N=72)	16% (N=145)	9% (N=559)
Satisfied	42% (N=185)	59% (N=65)	58% (N=72)	68% (N=145)	62% (N=559)

† = .10 * =- .05 ** = .01

Q23. Were you fitted for your body armor?	>25	26-50	51-99	100-499	500+
No, I was given body armor that approximates my body size**	7% (N=185)	6% (N=66)	11% (N=72)	4% (N=145)	5% (N=560)
Yes, I was fitted by representatives from the manufacturer**	64% (N=185)	82% (N=66)	71% (N=72)	77% (N=145)	68% (N=560)
Yes, I was fitted by internal agency representatives**	26% (N=185)	11% (N=66)	13% (N=72)	17% (N=145)	20% (N=560)
Yes, I was fitted by both the manufacturer AND agency representatives**	3% (N=185)	2% (N=66)	6% (N=72)	20% (N=145)	7% (N=560)

† = .10 * =- .05 ** = .01

Q31a. Does your agency conduct inspections to ensure that you are wearing your body armor?	>25	26-50	51-99	100-499	500+
Yes	30% (N=178)	20% (N=66)	21% (N=71)	33% (N=144)	29% (N=560)

† = .10 * =- .05 ** = .01

Q31b. Does your agency conduct inspections to ensure that your body armor is maintained properly?	>25	26-50	51-99	100-499	500+
Yes†	4% (N=183)	8% (N=65)	10% (N=71)	14% (N=143)	10% (N=558)

† = .10 * =- .05 ** = .01

Q30. How were you educated/trained on the benefits and limitations of wearing body armor, and on care and maintenance?	>25	26-50	51-99	100-499	500+
Manufacturer-provided literature/manuals -Benefits and limitations	52% (N=184)	49% (N=66)	50% (N=70)	55% (N=141)	55% (N=553)
Department-provided literature/manuals Benefits and limitations**	10% (N=185)	15% (N=66)	9% (N=71)	11% (N=141)	18% (N=554)
Supervisory staff -Benefits and limitations	11% (N=185)	14% (N=65)	7% (N=70)	15% (N=141)	12% (N=554)
Manufacturer/supplier representative -Benefits and limitations	18% (N=185)	21% (N=66)	10% (N=70)	16% (N=140)	16% (N=554)
In-service/specialized training -Benefits and limitations**	6% (N=185)	17% (N=66)	3% (N=70)	9% (N=141)	13% (N=554)
Academy -Benefits and limitations*	42% (N=185)	42% (N=65)	39% (N=70)	31% (N=141)	32% (N=554)
Firearms Training -Benefits and limitations**	24% (N=185)	34% (N=65)	26% (N=70)	13% (N=141)	35% (N=554)
Roll Call -Benefits and limitations†	2% (N=185)	11% (N=66)	3% (N=70)	5% (N=140)	5% (N=554)
Other (specify) -Benefits and limitations**	0% (N=185)	0% (N=66)	4% (N=70)	1% (N=141)	0% (N=554)
None was provided -Benefits and limitations	21% (N=185)	21% (N=66)	20% (N=70)	21% (N=141)	22% (N=554)
Manufacturer-provided literature/manuals-care and maintenance	61% (N=184)	64% (N=66)	51% (N=70)	63% (N=141)	57% (N=554)
Department-provided literature/manuals care and maintenance	12% (N=184)	9% (N=66)	10% (N=70)	8% (N=141)	13% (N=553)
Supervisory staff - care and maintenance	9% (N=184)	3% (N=66)	11% (N=70)	11% (N=141)	6% (N=554)
Manufacturer/supplier representative - care and maintenance	17% (N=185)	17% (N=66)	13% (N=70)	16% (N=141)	13% (N=554)

Q30 (cont'd). How were you educated/trained on the benefits and limitations of wearing body armor, and on care and maintenance?	>25	26-50	51-99	100-499	500+
In-service/specialized training - care and maintenance	3% (N=185)	6% (N=66)	3% (N=70)	6% (N=141)	5% (N=554)
Academy - care and maintenance	23% (N=185)	24% (N=66)	26% (N=70)	14% (N=141)	19% (N=554)
Firearms Training - care and maintenance	9% (N=184)	12% (N=65)	11% (N=70)	8% (N=141)	6% (N=554)
Roll Call - care and maintenance	0% (N=185)	3% (N=66)	4% (N=70)	2% (N=140)	1% (N-553)
Other (specify) - care and maintenance*	2% (N=185)	0% (N=66)	4% (N=70)	1% (N=140)	1% (N=554)
None was provided - care and maintenance	30% (N=184)	23% (N=66)	27% (N=70)	27% (N=141)	28% (N=554)

† = .10 * =- .05 ** = .01

III. Department Type

Q8. Why do you wear body armor?	Sheriff's Office	Police Department	State Police
Critical for Safety**	95% (N=265)	88% (N=723)	92% (N=61)
Workers compensation issues	9% (N=265)	12% (N=724)	8% (N=61)
Agency policy requires it**	37% (N=266)	55% (N=724)	32% (N=62)
Family Pressure**	18% (N=266)	12% (N=723)	25% (N=61)

† = .10 * =- .05 ** = .01

Q9. In which of the following situations has your body armor actually protected you?	Sheriff's Office	Police Department	State Police
Protection during shooting	3% (N=265)	3% (N=723)	2% (N=61)
Protection in car accident†	8% (N=265)	8% (N=724)	16% (N=62)
Protection from knife or other edged weapon assault	2% (N=265)	2% (N=723)	2% (N=61)
Protection from punch/kick or other blunt trauma	23% (N=265)	18% (N=723)	15% (N=62)
Other (specify)	0% (N=265)	1% (N=724)	2% (N=61)
N/A	70% (N=266)	74% (N=723)	74% (N=61)

† = .10 * =- .05 ** = .01

Q27. Please mark all of the following that you believe are TRUE concerning body armor	Sheriff's Office	Police Department	State Police
Can stop rifle bullets**	6% (N=258)	2% (N=705)	7% (N=60)
Moisture reduces the ballistic protection†	42% (N=258)	33% (N=704)	35% (N=60)
Proper way to store is on hanger	33% (N=258)	28% (N=705)	31% (N=59)
Is designed to last indefinitely	2% (N=257)	0% (N=704)	2% (N=60)
Can store in the trunk of a car	12% (N=258)	10% (N=705)	12% (N=59)
Should be replaced if penetrated by a bullet	98% (N=258)	95% (N=705)	95% (N=59)
Should be cleaned thoroughly with standard laundry**	15% (N=257)	7% (N=704)	8% (N=60)

† = .10 * =- .05 ** = .01

Q10. How do you store your body armor after usage?	Sheriff's Office	Police Department	State Police
Flat**	51% (N=265)	36% (N=731)	48% (N=61)
Fold it up**	3% (N=265)	0% (N=731)	2% (N=61)
Hang it on standard hanger/hook†	51% (N=265)	60% (N=731)	54% (N=61)
Specialized device/container	0% (N=256)	2% (N=731)	0% (N=61)

† = .10 * =- .05 ** = .01

Q14a. Does your agency have a written policy requiring you to wear body armor?	Sheriff's Office	Police Department	State Police
Yes**	49% (N=263)	90% (N=731)	61% (N=61)

† = .10 * =- .05 ** = .01

Q14b. Please mark the statement that best describes your agency's body armor wear policy***	Sheriff's Office	Police Department	State Police
I am required to wear body armor at all times when on duty	68.5% (N=87)	55.5% (N=347)	43.2% (N=16)
I am required to wear body armor at most times when on duty	18.1% (N=23)	39.7% (N=248)	18.9% (N=7)
I am not required to wear body armor at all times, but I am required to wear it under special	7.1% (N=9)	1.4% (N=9)	32.4% (N=12)
Other	6.3% (N=8)	3.4% (N=21)	5.4 (N=2)

† = .10 * =- .05 ** = .01

Q20. How often do you wear body armor?	Sheriff's Office	Police Department	State Police
Rarely/sometimes	2% (N=102)	1% (N=541)	0% (N=27)
Most of the time	7% (N=102)	12% (N=541)	11% (N=27)
All of the time	91% (N=102)	87% (N=541)	89% (N=27)

† = .10 * =- .05 ** = .01

Q24. How satisfied are you with the fit of your body armor?	Sheriff's Office	Police Department	State Police
Dissatisfied	26% (N=258)	30% (N=708)	29% (N=59)
Neutral	12% (N=258)	13% (N=708)	10% (N=59)
Satisfied	63% (N=258)	57% (N=708)	61% (N=59)

† = .10 * =- .05 ** = .01

Q23. Were you fitted for your body armor?	Sheriff's Office	Police Department	State Police
No, I was given body armor that approximates my body size	6% (N=259)	6% (N=708)	7% (N=60)
Yes, I was fitted by representatives from the manufacturer	71% (N=259)	70% (N=708)	68% (N=60)
Yes, I was fitted by internal agency representatives	19% (N=259)	19% (N=708)	22% (N=60)
Yes, I was fitted by both the manufacturer AND agency representatives	5% (N=259)	6% (N=708)	3% (N=60)

† = .10 * =- .05 ** = .01

Q31a. Does your agency conduct inspections to ensure that you are wearing your body armor?	Sheriff's Office	Police Department	State Police
Yes†	35% (N=255)	27% (N=703)	25% (N=60)

† = .10 * =- .05 ** = .01

Q31b. Does your agency conduct inspections to ensure that your body armor is maintained properly?	Sheriff's Office	Police Department	State Police
Yes**	16% (N=256)	7% (N=707)	14% (N=58)

† = .10 * =- .05 ** = .01

Q30. How were you educated/trained on the benefits and limitations of wearing body armor, and on care and maintenance?	Sheriff's Office	Police Department	State Police
Manufacturer-provided literature/manuals - Benefits and limitations†	59% (N=253)	52% (N=704)	46% (N=59)
Department-provided literature/manuals Benefits and limitations	17% (N=253)	14% (N=703)	24% (N=59)
Supervisory staff -Benefits and limitations	15% (N=253)	11% (N=703)	12% (N=59)
Manufacturer/supplier representative - Benefits and limitations*	21% (N=253)	14% (N=703)	21% (N=58)
In-service/specialized training -Benefits and limitations	13% (N=253)	10% (N=704)	14% (N=59)
Academy -Benefits and limitations	36% (N=253)	34% (N=703)	34% (N=59)
Firearms Training -Benefits and limitations	24% (N=253)	23% (N=703)	22% (N=59)
Roll Call -Benefits and limitations	5% (N=253)	5% (N=703)	5% (N=59)
Other (specify) -Benefits and limitations	1% (N=253)	0% (N=703)	0% (N=59)
None was provided -Benefits and limitations**	13% (N=253)	24% (N=704)	22% (N=59)
Manufacturer-provided literature/manuals-care and maintenance	61% (N=253)	N=58% (N=703)	49% (N=59)
Department-provided literature/manuals care and maintenance	11% (N=253)	12% (N=704)	10% (N=10%)
Supervisory staff - care and maintenance*	11% (N=253)	6% (N=704)	5% (N=59)
Manufacturer/supplier representative - care and maintenance†	18% (N=253)	13% (N=703)	20% (N=59)

Q30 (cont'd). How were you educated/trained on the benefits and limitations of wearing body armor, and on care and maintenance?	Sheriff's Office	Police Department	State Police
In-service/specialized training - care and maintenance	7% (N=254)	4% (N=703)	7% (N=58)
Academy - care and maintenance	20% (N=253)	19% (N=703)	24% (N=59)
Firearms Training - care and maintenance	8% (N=253)	7% (N=703)	10% (N=59)
Roll Call - care and maintenance	2% (N=253)	1% (N=704)	2% (N=58)
Other (specify) - care and maintenance	1% (N=253)	1% (N=703)	2% (N=59)
None was provided - care and maintenance	25% (N=253)	28% (N=703)	31% (N=31%)

† = .10 * =- .05 ** = .01

IV. Officer Gender

Q8. Why do you wear body armor?	Female	Male
Critical for Safety*	97% (N=113)	89% (N=933)
Workers compensation issues	12% (N=113)	11% (N=933)
Agency policy requires it	48% (N=113)	50% (N=933)
Family Pressure**	5% (N=113)	15% (N=933)

† = .10 * =- .05 ** = .01

Q9. In which of the following situations has your body armor actually protected you?	Female	Male
Protection during shooting	1% (N=113)	4% (N=933)
Protection in car accident	8% (N=113)	8% (N=933)
Protection from knife or other edged weapon assault	3% (N=113)	2% (N=933)
Protection from punch/kick or other blunt trauma†	13% (N=113)	20% (N=933)
Other (specify)	0% (N=113)	1% (N=933)
N/A*	81% (N=113)	72% (N=933)

† = .10 * =- .05 ** = .01

Q27. Please mark all of the following that you believe are TRUE concerning body armor	Female	Male
Can stop rifle bullets	4% (N=108)	3% (N=910)
Moisture reduces the ballistic protection	38% (N=108)	35% (N=910)
Proper way to store is on hanger	31% (N=108)	29% (N=910)
Is designed to last indefinitely	2% (N=108)	1% (N=910)
Can store in the trunk of a car	13% (N=108)	10% (N=910)
Should be replaced if penetrated by a bullet**	85% (N=108)	97% (N=910)
Should be cleaned thoroughly with standard laundry	11% (N=108)	9% (N=910)

† = .10 * =- .05 ** = .01

Q10. How do you store your body armor after usage?	Female	Male
Flat**	62% (N=113)	38% (N=941)
Fold it up	1% (N=113)	1% (N=941)
Hang it on standard hanger/hook**	44% (N=113)	59% (N=941)
Specialized device/container	0% (N=113)	2% (N=941)

† = .10 * =- .05 ** = .01

Q14a. Does your agency have a written policy requiring you to wear body armor?	Female	Male
Yes**	63% (N=113)	80% (N=938)

† = .10 * =- .05 ** = .01

Q14b. Please mark the statement that best describes your agency's body armor wear policy	Female	Male
I am required to wear body armor at all times when on duty	58.8% (N=40)	56.8% (N=409)
I am required to wear body armor at most times when on duty	36.8% (N=25)	35.1% (N=253)
I am not required to wear body armor at all times, but I am required to wear it under special	1.5% (N=1)	4.0% (N=29)
Other	2.9% (N=2)	4.0% (N=29)

† = .10 * =- .05 ** = .01

Q20. How often do you wear body armor?	Female	Male
Rarely/sometimes	0% (N=50)	1% (N=618)
Most of the time	4% (N=50)	12% (N=618)
All of the time	96% (N=50)	87% (N=618)

† = .10 * =- .05 ** = .01

Q24. How satisfied are you with the fit of your body armor?	Female	Male
Dissatisfied	25% (N=110)	29% (N=914)
Neutral	13% (N=110)	12% (N=914)
Satisfied	62% (N=110)	58% (N=914)

† = .10 * =- .05 ** = .01

Q23. Were you fitted for your body armor?	Female	Male
No, I was given body armor that approximates my body size**	4% (N=108)	6% (N=914)
Yes, I was fitted by representatives from the manufacturer**	64% (N=108)	71% (N=914)
Yes, I was fitted by internal agency representatives**	14% (N=108)	20% (N=914)
Yes, I was fitted by both the manufacturer AND agency representatives**	19% (N=108)	4% (N=914)

† = .10 * =- .05 ** = .01

Q31a. Does your agency conduct inspections to ensure that you are wearing your body armor?	Female	Male
Yes	28% (N=109)	29% (N=906)

† = .10 * =- .05 ** = .01

Q31b. Does your agency conduct inspections to ensure that your body armor is maintained properly?	Female	Male
Yes†	14% (N=108)	9% (N=909)

† = .10 * =- .05 ** = .01

Q30. How were you educated/trained on the benefits and limitations of wearing body armor, and on care and maintenance?	Female	Male
Manufacturer-provided literature/manuals -Benefits and limitations	59% (N=108)	53% (N=904)
Department-provided literature/manuals Benefits and limitations**	29% (N=108)	13% (N=904)
Supervisory staff -Benefits and limitations	17% (N=108)	12% (N=904)
Manufacturer/supplier representative -Benefits and limitations	21% (N=108)	16% (N=903)
In-service/specialized training -Benefits and limitations	12% (N=108)	10% (N=903)
Academy -Benefits and limitations	29% (N=108)	35% (N=904)
Firearms Training -Benefits and limitations**	36% (N=108)	22% (N=903)
Roll Call -Benefits and limitations	4% (N=108)	5% (N=904)
Other (specify) -Benefits and limitations	1% (N=108)	1% (N=904)
None was provided -Benefits and limitations†	15% (N=108)	22% (N=904)
Manufacturer-provided literature/manuals-care and maintenance	63% (N=108)	58% (N=904)
Department-provided literature/manuals care and maintenance**	25% (N=108)	10% (N=903)
Supervisory staff - care and maintenance	11% (N=108)	7% (N=904)
Manufacturer/supplier representative - care and maintenance	19% (N=108)	14% (N=904)

Q30 (cont'd). How were you educated/trained on the benefits and limitations of wearing body armor, and on care and maintenance?	Female	Male
In-service/specialized training - care and maintenance	7% (N=108)	5% (N=904)
Academy - care and maintenance	20% (N=108)	20% (N=904)
Firearms Training - care and maintenance**	20% (N=107)	6% (N=904)
Roll Call - care and maintenance	3% (N=108)	1% (N=904)
Other (specify) - care and maintenance	1% (N=108)	1% (N=903)
None was provided - care and maintenance	22% (N=108)	28% (N=904)

† = .10 * =- .05 ** = .01

V. Region

Q8. Why do you wear body armor?	NE	SE	Midwest	West
Critical for Safety**	85% (N=406)	94% (N=252)	88% (N=196)	99% (N=197)
Workers compensation issues**	7% (N=406)	18% (N=252)	9% (N=195)	14% (N=197)
Agency policy requires it*	50% (N=405)	56% (N=252)	47% (N=196)	42% (N=197)
Family Pressure**	12% (N=406)	25% (N=252)	11% (N=196)	9% (N=197)

† = .10 * =- .05 ** = .01

Q9. In which of the following situations has your body armor actually protected you?	NE	SE	Midwest	West
Protection during shooting*	4% (N=405)	2% (N=252)	1% (N=195)	6% (N=197)
Protection in car accident*	5% (N=406)	12% (N=251)	9% (N=195)	7% (N=197)
Protection from knife or other edged weapon assault**	1% (N=405)	4% (N=251)	1% (N=196)	3% (N=197)
Protection from punch/kick or other blunt trauma**	8% (N=405)	28% (N=251)	28% (N=195)	22% (N=197)
Other (specify)	1% (N=405)	0% (N=251)	0% (N=195)	2% (N=197)
N/A**	84% (N=406)	62% (N=252)	28% (N=196)	69% (N=197)

† = .10 * =- .05 ** = .01

Q27. Please mark all of the following that you believe are TRUE concerning body armor	NE	SE	Midwest	West
Can stop rifle bullets*	1% (N=390)	4% (N=252)	4% (N=189)	4% (N=190)
Moisture reduces the ballistic protection**	30% (N=390)	35% (N=252)	46% (N=189)	38% (N=189)
Proper way to store is on hanger†	26% (N=391)	33% (N=252)	28% (N=189)	34% (N=189)
Is designed to last indefinitely	1% (N=390)	1% (N=252)	1% (N=189)	0% (N=189)
Can store in the trunk of a car**	8% (N=391)	14% (N=252)	15% (N=189)	7% (N=189)
Should be replaced if penetrated by a bullet	95% (N=391)	97% (N=252)	93% (N=189)	96% (N=190)
Should be cleaned thoroughly with standard laundry*	6% (N=391)	13% (N=252)	8% (N=190)	11% (N=189)

† = .10 * =- .05 ** = .01

Q10. How do you store your body armor after usage?	NE	SE	Midwest	West
Flat**	20% (N=406)	58% (N=259)	52% (N=196)	47% (N=197)
Fold it up	1% (N=406)	2% (N=258)	0% (N=195)	1% (N=197)
Hang it on standard hanger/hook**	70% (N=406)	39% (N=259)	54% (N=196)	59% (N=197)
Specialized device/container**	1% (N=406)	4% (N=259)	1% (N=196)	0% (N=197)

† = .10 * =- .05 ** = .01

Q14a. Does your agency have a written policy requiring you to wear body armor?	NE	SE	Midwest	West
Yes**	90% (N=406)	80% (N=260)	68% (N=195)	58% (N=194)

† = .10 * =- .05 ** = .01

Q14b. Please mark the statement that best describes your agency's body armor wear policy***	NE	SE	Midwest	West
I am required to wear body armor at all times when on duty	45.6% (N=161)	65.3% (N=126)	69.9% (N=93)	63.6% (N=70)
I am required to wear body armor at most times when on duty	51.8% (N=183)	19.7% (N=38)	23.3% (N=31)	23.6% (N=26)
I am not required to wear body armor at all times, but I am required to wear it under special	0.8% (N=3)	9.3% (N=18)	3.0% (N=4)	4.5% (N=5)
Other	1.7% (N=6)	5.7% (N=11)	3.8% (N=5)	8.2% (N=9)

† = .10 * =- .05 ** = .01

Q20. How often do you wear body armor?**	NE	SE	Midwest	West
Rarely/sometimes	0% (N=275)	1% (N=178)	0% (N=116)	3% (N=99)
Most of the time	17% (N=275)	6% (N=178)	11% (N=116)	7 (N=99)
All of the time	83% (N=275)	94% (N=178)	89% (N=116)	90% (N=99)

† = .10 * =- .05 ** = .01

Q24. How satisfied are you with the fit of your body armor?**	NE	SE	Midwest	West
Dissatisfied	28% (N=392)	32% (N=254)	30% (N=190)	26% (N=190)
Neutral	8% (N=392)	17% (N=254)	17% (N=190)	12% (N=190)
Satisfied	64% (N=392)	52% (N=254)	53% (N=190)	62% (N=190)

† = .10 * =- .05 ** = .01

Q23. Were you fitted for your body armor?	NE	SE	Midwest	West
No, I was given body armor that approximates my body size†	5% (N=392)	7% (N=256)	6% (N=191)	5% (N=189)
Yes, I was fitted by representatives from the manufacturer†	70% (N=392)	67% (N=256)	75% (N=191)	68% (N=189)
Yes, I was fitted by internal agency representatives†	18% (N=392)	22% (N=256)	16% (N=191)	22% (N=189)
Yes, I was fitted by both the manufacturer AND agency representatives†	8% (N=392)	4% (N=256)	3% (N=191)	5% (N=189)

† = .10 * =- .05 ** = .01

Q31a. Does your agency conduct inspections to ensure that you are wearing your body armor?	NE	SE	Midwest	West
Yes**	22% (N=386)	38% (N=252)	25% (N=190)	33% (N=189)

† = .10 * =- .05 ** = .01

Q31b. Does your agency conduct inspections to ensure that your body armor is maintained properly?	NE	SE	Midwest	West
Yes**	6% (N=391)	16% (N=251)	5% (N=190)	11% (N=190)

† = .10 * =- .05 ** = .01

Q30. How were you educated/trained on the benefits and limitations of wearing body armor, and on care and maintenance?	NE	SE	Midwest	West
Manufacturer-provided literature/manuals -Benefits and limitations†	57% (N=390)	47% (N=250)	54% (N=190)	55% (N=185)
Department-provided literature/manuals Benefits and limitations**	18% (N=390)	12% (N=251)	9% (N=189)	18% (N=185)
Supervisory staff -Benefits and limitations†	11% (N=390)	13% (N=250)	8% (N=190)	17% (N=186)
Manufacturer/supplier representative - Benefits and limitations*	14% (N=390)	15% (N=250)	16% (N=190)	23% (N=186)
In-service/specialized training -Benefits and limitations*	10% (N=389)	10% (N=250)	6% (N=190)	16% (N=186)
Academy -Benefits and limitations	30% (N=390)	38% (N=250)	37% (N=189)	37% (N=189)
Firearms Training -Benefits and limitations	25% (N=390)	25% (N=250)	17% (N=190)	24% (N=186)
Roll Call -Benefits and limitations	4% (N=390)	6% (N=250)	5% (N=190)	5% (N=185)
Other (specify) -Benefits and limitations	0% (N=389)	1% (N=250)	1% (N=189)	0% (N=186)
None was provided -Benefits and limitations**	26% (N=389)	20% (N=250)	22% (N=190)	14% (N=185)
Manufacturer-provided literature/manuals-care and maintenance	57% (N=389)	60% (N=250)	58% (N=190)	60% (N=186)
Department-provided literature/manuals care and maintenance**	14% (N=390)	12% (N=250)	5% (N=190)	14% (N=185)
Supervisory staff - care and maintenance*	5% (N=390)	10% (N=250)	5% (N=189)	10% (N=186)
Manufacturer/supplier representative - care and maintenance**	10% (N=389)	13% (N=250)	19% (N=190)	22% (N=186)

Q30 (cont'd). How were you educated/trained on the benefits and limitations of wearing body armor, and on care and maintenance?	NE	SE	Midwest	West
In-service/specialized training - care and maintenance	5% (N=390)	4% (N=250)	3% (N=190)	6% (N=186)
Academy - care and maintenance	19% (N=390)	21% (N=251)	21% (N=190)	18% (N=186)
Firearms Training - care and maintenance	8% (N=389)	8% (N=250)	7% (N=190)	6% (N=185)
Roll Call - care and maintenance*	1% (N=389)	2% (N=250)	2% (N=190)	4% (N=186)
Other (specify) - care and maintenance	1% (N=389)	0% (N=250)	2% (N=190)	1% (N=186)
None was provided - care and maintenance	29% (N=389)	28% (N=250)	30% (N=190)	25% (N=186)

† = .10 * =- .05 ** = .01

APPENDIX F

Ballistic Testing Results

Table F-1. V50 and Backface Deformation for New Level II and Level IIIa Soft Armor Vests.

Code New Number (a)	Weight (lb)	Plies	Brand	Model	Level	Caliber	Shots Total (V50)	V50 (fps)	High Partial (fps)	Low Complete (fps)	Maximum Deformation (mm)	Minimum Deformation (mm)
1.1 Front	1.37	14	Safariland	SII-6.0	II	9mm Luger	12/10	1541	1597	1526	44	34
1.1 Back	1.37	14	Safariland	SII-6.0	II	9mm Luger	12/10	1531	1585	1509	40	29
1.2 Front	1.38	14	Safariland	SII-6.0	II	9mm Luger	12/10	1503	1523	1463	46	29
1.2 Back	1.38	14	Safariland	SII-6.0	II	9mm Luger	12/10	1540	1568	1486	37	31
1.3 Front	1.76	12	Safariland	SIIIA-6.0	IIIA	9mm Luger	12/12	1658	1664	1644	44	30
1.3 Back	1.76	12	Safariland	SIIIA-6.0	IIIA	9mm Luger	12/12	1629	1637	1629	39	30
1.4 Front	1.92	34	Second Chance	329-IIIA R04 6050	IIIA	9mm Luger	12/8	1838	1884	1827	60	33
1.4 Back	2.06	34	Second Chance	329-IIIA R04 6050	IIIA	9mm Luger	12/8	1817	1840	1791	52	36
1.5 Front	1.92	34	Second Chance	329-IIIA R04 6050	IIIA	9mm Luger	12/10	1833	1833	1810	45	34
1.5 Back	2.05	34	Second Chance	329-IIIA R04 6050	IIIA	9mm Luger	12/10	1793	1789	1795	52	39
1.6 Front	1.48	26	Second Chance	329-II R01 6040	II	9mm Luger	12/8	1699	1759	1657	64	36
1.6 Back	1.57	26	Second Chance	329-II R01 6040	II	9mm Luger	12/10	1702	1702	1667	56	46
1.7 Front	1.93	34	Second Chance	329-IIIA R04 6050	IIIA	9mm Luger	12/10	1878	1868	1864	56	34
1.7 Back	2.06	34	Second Chance	329-IIIA R04 6050	IIIA	9mm Luger	12/10	1831	1865	1789	44	34
1.8 Front	1.93	34	Second Chance	329-IIIA R04 6050	IIIA	9mm Luger	12/10	1877	1890	1844	65	38
1.8 Back	2.06	34	Second Chance	329-IIIA R04 6050	IIIA	9mm Luger	12/12	1822	1839	1814	46	37
2.1 Front	1.49	26	Second Chance	329-II R01 6040	II	9mm Luger	12/10	1696	1700	1652	58	34
2.1 Back	1.56	26	Second Chance	329-II R01 6040	II	9mm Luger	12/10	1698	1708	1678	59	42
2.2 Front	1.48	26	Second Chance	329-II R01 6040	II	9mm Luger	12/12	1695	1697	1665	52	39
2.2 Back	1.57	26	Second Chance	329-II R01 6040	II	9mm Luger	12/10	1726	1741	1699	53	39
2.3 Front	1.38	14	Safariland	SII-6.0	II	9mm Luger	12/12	1555	1555	1544	41	31
2.3 Back	1.38	14	Safariland	SII-6.0	II	9mm Luger	12/10	1561	1590	1561	46	32

2.4 Front	1.76	12	Safariland	SIIIA-6.0	IIIA	9mm Luger	12/10	1613	1597	1606	38	30
2.4 Back	1.77	12	Safariland	SIIIA-6.0	IIIA	9mm Luger	12/10	1633	1685	1607	40	30
2.5 Front	1.76	12	Safariland	SIIIA-6.0	IIIA	9mm Luger	12/10	1598	1583	1586	47	32
2.5 Back	1.77	12	Safariland	SIIIA-6.0	IIIA	9mm Luger	12/10	1610	1624	1591	45	30
2.6 Front	1.38	14	Safariland	SII-6.0	II	9mm Luger	12/10	1511	1534	1495	46	33
2.6 Back	1.37	14	Safariland	SII-6.0	II	9mm Luger	12/10	1503	1550	1459	52	33
2.7 Front	1.75	12	Safariland	SIIIA-6.0	IIIA	9mm Luger	12/8	1630	1632	1581	48	31
2.7 Back	1.76	12	Safariland	SIIIA-6.0	IIIA	9mm Luger	12/10	1604	1610	1594	40	29

Table F-2. V50 and Backface Deformation for 5 Year Old Level II and Level IIIa Soft Armor Vests.

Climate Zone	Weight (lb)	Plies	Type	Brand	Model	Level	Caliber	Shots Total (V50) (fps)	V50 (fps)	High Partial (fps)	Low Complete (fps)	Maximum Deformation (mm)	Minimum Deformation (mm)
Low/high	1.56	39	Hybrid	ABA	XT3A-2	IIIA	9mm Luger	12/10	1599	1623	1579	(c)	(c)
Low/high	1.54	39	Hybrid	ABA	XT3A-2	IIIA	9mm Luger	12/10	1518	1572	1470	(c)	(c)
Low/high	1.78	30	Woven Aramid	Second Chance	MON-IIIA	IIIA	9mm Luger	12/8	1614	1658	1586	(c)	(c)
Low/high	1.87	30	Woven Aramid	Second Chance	MON-IIIA	IIIA	9mm Luger	12/10	1583	1627	1564	(c)	(c)
High/low	2.24	34	Woven Aramid	Second Chance	MON-IIIA ++305020	IIIA	9mm Luger	12/10	1632	1663	1624	(c)	(c)
High/low	2.24	34	Woven Aramid	Second Chance	MON-IIIA ++305020	IIIA	9mm Luger	12/10	1640	1665	1636	(c)	(c)
High/low	1.71	23	Hybrid	ABA	XT2-2	II	9mm Luger	12/10	1511	1542	1492	44	34
High/low	1.66	23	Hybrid	ABA	XT2-2	II	9mm Luger	12/10	1546	1602	1489	47	32
High/low	1.72	13	Woven Aramid	Second Chance	SII-6.0	II	9mm Luger	12/10	1467	1477	1469	39	31
High/low	1.91	13	Woven Aramid	Second Chance	SII-6.0	II	9mm Luger	12/10	1495	1494	1491	42	31
High/low	1.48	23	Hybrid	ABA	XT2-2	II	9mm Luger	12/8	1535	1572	1508	45	32
High/low	1.84	23	Hybrid	ABA	XT2-2	II	9mm Luger	12/8	1488	1516	1474	53	34
Low/high	2.09	30	Hybrid	ABA	XT3A-2	IIIA	9mm Luger	12/12	1658	1687	1643	41	34
Low/high	2.13	30	Hybrid	ABA	XT3A-2	IIIA	9mm Luger	12/10	1636	1669	1602	51	33
Low/high	1.51	23	Hybrid	ABA	XT2-2	II	9mm Luger	12/10	1539	1591	1471	49	18
Low/high	1.52	23	Hybrid	ABA	XT2-2	II	9mm Luger	12/8	1589	1650	1554	59	34
Low/high	2.28	30	Hybrid	ABA	XT3A-2	IIIA	9mm Luger	12/6	1672	1770	1614	51	31
Low/high	2.41	30	Hybrid	ABA	XT3A-2	IIIA	9mm Luger	12/12	1662	1698	1650	43	30
Low/low	1.64	24	Woven Aramid	Second Chance	MON-II 107121	II	9mm Luger	12/8	1523	1545	1440	52	32
Low/low	1.44	24	Woven Aramid	Second Chance	MON-II 107121	II	9mm Luger	12/10	1566	1555	1561	53	35
Low/low	1.82	30	Woven Aramid	Second Chance	MON-IIIA 107121	IIIA	9mm Luger	12/12	1609	1646	1585	48	35
Low/low	1.69	30	Woven Aramid	Second Chance	MON-IIIA 107121	IIIA	9mm Luger	12/12	1652	1661	1624	44	39
Low/low	1.92	30	Woven Aramid	Second Chance	SUM IIIA R026010	IIIA	9mm Luger	12/12	1648	1663	1650	54	32
Low/low	1.47	30	Woven Aramid	Second Chance	SUM IIIA R026010	IIIA	9mm Luger	11/10	1649	1695	1587	37	34
Low/low	1.35	31	Hybrid	ABA	XT2-2	II	9mm Luger	12/10	1630	1660	1595	55	37

Low/low	1.42	31	Hybrid	ABA	XT2-2	II	9mm Luger	12/8	1652	1652	1644	58	37
Low/low	1.79	30	Hybrid	ABA	XT3A-2	IIIA	9mm Luger	12/8	1611	1689	1581	40	30
Low/low	1.84	30	Hybrid	ABA	XT3A-2	IIIA	9mm Luger	12/10	1649	1660	1638	43	33
Low/low	1.79	23	Hybrid	ABA	XT2-2	II	9mm Luger	12/10	1586	1614	1572	56	28
Low/low	1.50	23	Hybrid	ABA	XT2-2	II	9mm Luger	12/4	1553	1648	1512	43	34
Low/low	2.06	30	Woven Aramid	Second Chance	MON-IIIA 107121	IIIA	9mm Luger	12/10	1619	1618	1618	43	35
Low/low	1.98	30	Woven Aramid	Second Chance	MON-IIIA 107121	IIIA	9mm Luger	12/10	1654	1682	1630	55	36
High/high	1.56	24	Woven Aramid	Second Chance	MON-II 10721	II	9mm Luger	12/8	1547	1582	1455	63	36
High/high	1.45	24	Woven Aramid	Second Chance	MON-II 10721	II	9mm Luger	12/12	1507	1543	1492	44	36
High/high	2.07	29	Hybrid	PACA	4KGS3A	IIIA	9mm Luger	12/10	1750	1769	1710	46	25
High/high	1.89	29	Hybrid	PACA	4KGS3A	IIIA	9mm Luger	12/10	1722	1774	1658	50	35
Low/high	2.11	30	Woven Aramid	Second Chance	MON-IIIA 107121	IIIA	9mm Luger	12/10	1679	1738	1654	41	35
Low/high	2.11	30	Woven Aramid	Second Chance	MON-IIIA 107121	IIIA	9mm Luger	12/12	1681	1687	1667	44	38
Low/high	1.86	30	Woven Aramid	Second Chance	MON-IIIA 107121	IIIA	9mm Luger	12/12	1639	1668	1606	42	36
Low/high	1.71	30	Woven Aramid	Second Chance	MON-IIIA 107121	IIIA	9mm Luger	12/12	1673	1685	1614	48	33
Low/high	1.84	30	Woven Aramid	Second Chance	MON-IIIA 107121	IIIA	9mm Luger	12/10	1629	1643	1580	48	34
Low/high	1.75	30	Woven Aramid	Second Chance	MON-IIIA 107121	IIIA	9mm Luger	12/12	1644	1638	1632	47	37
High/high	2.06	20	Hybrid	PACA	RTGS2	II	9mm Luger	12/10	1587	1597	1562	56	36
High/high	1.59	20	Hybrid	PACA	RTGS2	II	9mm Luger	12/8	1554	1581	1507	58	38
High/low	1.68	24	Woven Aramid	Second Chance	MON-II 107121	II	9mm Luger	12/8	1605	1616	1580	54	33
High/low	1.78	24	Woven Aramid	Second Chance	MON-II 107121	II	9mm Luger	12/10	1592	1605	1569	47	36
High/low	1.68	23	Hybrid	ABA	XT2-2	II	9mm Luger	12/10	1514	1531	1501	52	36
High/low	1.98	23	Hybrid	ABA	XT2-2	II	9mm Luger	12/10	1554	1579	1525	44	35
High/high	1.73	24	Hybrid	Point Blank	H17-5	II	9mm Luger	12/12	1704	1707	1696	55	35
High/high	1.90	24	Hybrid	Point Blank	H17-5	II	9mm Luger	12/8	1634	1674	1591	67	35
High/low	2.46	34	Woven Aramid	Second Chance	MON-IIIA ++305020	IIIA	9mm Luger	12/12	1688	1696	1668	47	35
High/low	2.42	34	Woven Aramid	Second Chance	MON-IIIA ++305020	IIIA	9mm Luger	12/12	1678	1684	1691	40	33
High/high	1.75	30	Woven Aramid	Second Chance	Monarch Summit	IIIA	9mm Luger	12/12	1632	1663	1625	48	36
High/high	1.78	30	Woven Aramid	Second Chance	Monarch Summit	IIIA	9mm Luger	12/10	1630	1664	1577	56	35
High/high	1.74	30	Woven Aramid	Second Chance	Monarch Summit	IIIA	9mm Luger	12/12	1605	1628	1581	39	35
High/high	1.80	30	Woven Aramid	Second Chance	Monarch Summit	IIIA	9mm Luger	12/10	1651	1677	1632	46	30
High/high	2.02	30	Woven Aramid	Second Chance	Monarch Summit	IIIA	9mm Luger	12/10	1620	1613	1610	44	36
High/high	1.76	30	Woven Aramid	Second Chance	Monarch Summit	IIIA	9mm Luger	12/10	1652	1657	1644	40	32
High/high	2.08	14	Hybrid	ABA	SII-6.0	II	9mm Luger	12/10	1500	1546	1475	37	32

High/high	1.98	14	Hybrid	ABA	SII-6.0	II	9mm Luger	12/10	1507	1525	1501	40	32

Table F-3: Shot by shot ballistic data

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 3/25/11

TEST PANEL

AMERICAN BODY R
ARMOXLS NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : NA 39 NA 1.56
Hardness : Plies/Laminates lbs. CODE 1.1
: Sample No. : (FRONT)

Date Rec'd. : Via : Returned :
03/22/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT3A-2; SERIAL#: 05097673; DOM: SEP. 2005; OFFICER & ID#: DAVID PEPLOWSKI; 6889

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 69 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.85 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 29% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 98.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2987	1674	2987	1674	1674	C	Y	
2		3108	1609	3099	1613	1611	C	Y	
3		3419	1462	3414	1465	1463	P		
4		3284	1523	3275	1527	1525	P	Y	
5		3167	1579	3167	1579	1579	C	Y	
6		3300	1515	3300	1515	1515	P		
7		3167	1579	3167	1579	1579	C	Y	
8		3207	1559	3207	1559	1559	P	Y	
9		3108	1609	3104	1611	1610	P	Y	
10		3014	1659	3014	1659	1659	C	Y	
11		3081	1623	3081	1623	1623	P	Y	
12		3189	1568	3189	1568	1568	P	Y	

REMARKS :

MAKE-UP: LAYERS 1-18, FLEX ARAMID FILM. LAYERS 19-25, FLEX WOVEN ARAMID FIBER (31X31). LAYERS 26-39, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-39, TACK AT SHOULDERS AND BOTTOM CENTER.
NOTE: BALLISTIC INSERT PANEL WAS NOT IN A REMOVABLE CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1599
High Partial : 1623
Low Complete : 1579
Range of Results : 149
Range of Mixed : 44

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 3/25/11

TEST PANEL

AMERICAN BODY R
ARMOXLS NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : NA 39 NA 1.54
Hardness : Plies/Laminates : lbs. CODE 1.1
: Sample No. : (BACK)

Date Rec'd. : Via : Returned : 03/22/11
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT3A-2; SERIAL#: 05097674; DOM: SEP. 2005; OFFICER & ID#: DAVID PEPLOWSKI; 6889

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 69 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.85 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 29% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 97.7 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2969	1684	2964	1687	1685	C		
2		3180	1572	3180	1572	1572	P	Y	
3		3099	1613	3104	1611	1612	C		
4		3149	1588	3144	1590	1589	C	Y	
5		3248	1539	3248	1539	1539	P	Y	
6		3212	1557	3212	1557	1557	C	Y	
7		3293	1518	3284	1523	1520	C	Y	
8		3405	1468	3400	1471	1470	P	Y	
9		3315	1508	3311	1510	1509	P	Y	
10		3338	1498	3338	1498	1498	C	Y	
11		3401	1470	3401	1470	1470	C	Y	
12		3446	1451	3441	1453	1452	P	Y	

REMARKS :

MAKE-UP: LAYERS 1-18, FLEX ARAMID FILM. LAYERS 19-25, FLEX WOVEN ARAMID FIBER (31X31). LAYERS 26-39, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-39, TACK AT TOP CORNERS AND BOTTOM CENTER.
NOTE: BALLISTIC INSERT PANEL WAS NOT IN A REMOVABLE CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1518
High Partial : 1572
Low Complete : 1470
Range of Results : 137
Range of Mixed : 102

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 3/25/11

TEST PANEL

SECOND CHANCE ARMOR,
BODY 222216 NA NA INC.

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. :
Weight :
Hardness : NA 30 NA 1.78
Plies/Laminates : lbs. CODE 1.2
Sample No. : (FRONT)

Date Rec'd. : Via : Returned :
03/22/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: AL070573345; DOM: 07/08/05; OFFICER & ID#: MATT BRADRICK; 6235

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 70 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.80 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 30% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 98.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3018	1657	3014	1659	1658	P	Y	
2		2879	1737	2879	1737	1737	C		
3		3014	1659	3014	1659	1659	C		
4		3063	1632	3059	1635	1633	P	Y	
5		2991	1672	2987	1674	1673	C		
6		3045	1642	3045	1642	1642	C	Y	
7		3117	1604	3113	1606	1605	C	Y	
8		3230	1548	3230	1548	1548	P	Y	
9		3095	1616	3095	1616	1616	P	Y	
10		2942	1700	2942	1700	1700	C		
11		3086	1620	3086	1620	1620	C	Y	
12		3153	1586	3153	1586	1586	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.
NOTE: BALLISTIC INSERT PANEL WAS NOT IN A REMOVABLE CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1614
High Partial : 1658
Low Complete : 1586
Range of Results : 110
Range of Mixed : 72

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 3/25/11

TEST PANEL

SECOND CHANCE ARMOR,
BODY 222216 NA NA INC.

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. :
Weight :
Hardness : NA 30 NA 1.87
Plies/Laminates : lbs. CODE 1.2
Sample No. : (BACK)

Date Rec'd. : Via : Returned : 03/22/11
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: AL070573345; DOM: 07/08/05; OFFICER & ID#: MATT BRADRICK; 6235

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 70 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.80 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 30% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 97.4 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3028	1651	3024	1653	1652	C	Y	
2		3252	1538	3248	1539	1538	P	Y	
3		3189	1568	3189	1568	1568	C	Y	
4		3275	1527	3275	1527	1527	P		
5		3194	1565	3185	1570	1568	C	Y	
6		3288	1521	3284	1523	1522	P		
7		3198	1563	3194	1565	1564	C	Y	
8		3239	1544	3234	1546	1545	P	Y	
9		3131	1597	3126	1599	1598	C	Y	
10		3149	1588	3149	1588	1588	P	Y	
11		3077	1625	3068	1630	1627	P	Y	
12		3158	1583	3158	1583	1583	P	Y	

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.
NOTE: BALLISTIC INSERT PANEL WAS NOT IN A REMOVABLE CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1583
High Partial : 1627
Low Complete : 1564
Range of Results : 114
Range of Mixed : 63

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 3/25/11

TEST PANEL

SECOND CHANCE BODY ARMOR, INC.
A2215/2015 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. :
Weight :
Hardness : NA 34 NA 2.24
Plies/Laminates : lbs. CODE 2.1
Sample No. : (FRONT)

Date Rec'd. : Via : Returned :
03/24/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA++ 305020; SERIAL#: NYPD-13653; DOM: 08/05; OFFICER & ID#: FRANK CAUSO; 941511

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 70 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.74 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 31% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 98.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3242	1542	3238	1544	1543	P		
2		3117	1604	3113	1606	1605	P	Y	
3		2960	1689	2955	1692	1691	C	Y	
4		3025	1653	3020	1656	1654	C	Y	
5		3180	1572	3176	1574	1573	P		
6		3081	1623	3077	1625	1624	C	Y	
7		3143	1591	3143	1591	1591	P	Y	
8		3063	1632	3059	1635	1633	C	Y	
9		3077	1625	3077	1625	1625	P	Y	
10		3053	1638	3050	1639	1639	C	Y	
11		3126	1599	3126	1599	1599	P	Y	
12		3005	1664	3009	1662	1663	P	Y	

REMARKS :

MAKE-UP: LAYERS 1-34, FLEX WOVEN ARAMID FIBER (25X25).
STITCHING: LAYERS 1-20, 1.25" DIAMOND QUILT STITCH. LAYERS 21-34, 1.25" BOX STITCH. LAYERS 1-34, TWO VERTICAL STITCHES AT CENTER OF PANEL, TOP TO BOTTOM.
NOTE: BALLISTIC INSERT PANEL WAS IN A REMOVABLE CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1632
High Partial : 1663
Low Complete : 1624
Range of Results : 100
Range of Mixed : 39

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 3/25/11

TEST PANEL

SECOND CHANCE BODY ARMOR, INC.
A2215/2015 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. :
Weight :
Hardness : NA 34 NA 2.24
Plies/Laminates : lbs. CODE 2.1
Sample No. : (BACK)

Date Rec'd. : Via : Returned : 03/24/11
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA++ 305020; SERIAL#: NYPD-13653; DOM: 08/05; OFFICER & ID#: FRANK CAUSO; 941511

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 70 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.74 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 31% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE

NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 98.0 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3018	1657	3014	1659	1658	C	Y	
2		3257	1535	3252	1538	1536	P		
3		3113	1606	3113	1606	1606	P	Y	
4		3075	1626	3075	1626	1626	P	Y	
5		3005	1664	3000	1667	1665	P	Y	
6		2924	1710	2924	1710	1710	C		
7		3041	1644	3041	1644	1644	C	Y	
8		3104	1611	3104	1611	1611	P	Y	
9		3027	1652	3023	1654	1653	C	Y	
10		3059	1635	3054	1637	1636	C	Y	
11		3108	1609	3104	1611	1610	P	Y	
12		2951	1694	2951	1694	1694	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-34, FLEX WOVEN ARAMID FIBER (25X25).
STITCHING: LAYERS 1-20, 1.25" DIAMOND QUILT STITCH. LAYERS 21-34, 1.25" BOX STITCH. LAYERS 1-34, TWO VERTICAL STITCHES AT CENTER OF PANEL, TOP TO BOTTOM.
NOTE: BALLISTIC INSERT PANEL WAS IN A REMOVABLE CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1640
High Partial : 1665
Low Complete : 1636
Range of Results : 88
Range of Mixed : 29

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 3/30/11

TEST PANEL

Manufacturer : Size : Thicknesses : Avg. Thick. : SECOND CHANCE BODY ARMOR, INC. XLR NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 03/25/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 23 NA 1.71 lbs. Sample No. : CODE 4.1 (FRONT)

Description : SEE REMARKS FOR MAKEUP AND STITCHING
MODEL#: XT2-2; SERIAL#: 05143169; DOM: 12/05; LOT# 1942

SET-UP Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II

Primary Vel. Location : 9.0 ft. From Muzzle Primary Vel. Screens : 6.5 ft., 11.5 ft.

Range No. : 2 Temp. : 69 F

Obliquity : Witness Panel : Backing Material : Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Barrel No./Gun : 357/9-R1 Gunner : CHES BP : RH : 29.85 in. Hg 33%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(2) : (1) : PER-NIJ-STD-0101.04 LEVEL II (ABBREVIATED) PRE-TEST CLAY TEMP: 100.6 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3347	1494	3342	1496	1495	P	Y	DEF. 44mm
2		3095	1616	3099	1613	1614	C		
3		3207	1559	3212	1557	1558	C	Y	
4		3351	1492	3351	1492	1492	C	Y	
5		3527	1418	3522	1420	1419	P		DEF. 44mm
6		3387	1476	3387	1476	1476	P	Y	DEF. 44mm
7		3243	1542	3243	1542	1542	P	Y	DEF. 41mm
8		3212	1557	3216	1555	1556	C	Y	
9		3270	1529	3275	1527	1528	C	Y	
10		3342	1496	3347	1494	1495	P	Y	DEF. 34mm
11		3311	1510	3315	1508	1509	C	Y	
12		3419	1462	3419	1462	1462	P	Y	DEF. 42mm

REMARKS :

MAKE-UP: LAYERS 1-8, FLEX ARAMID FILM.
LAYERS 9-13, FLEX WOVEN ARAMID FIBER(34x34).
LAYERS 14-23, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-23, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1511
High Partial : 1542
Low Complete : 1492
Range of Results : 96
Range of Mixed : 50

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 3/30/11

TEST PANEL

Manufacturer : Size : Thicknesses : Avg. Thick. : SECOND CHANCE BODY ARMOR, INC. XLSL NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 03/25/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 23 NA 1.66 lbs. Sample No. : CODE 4.1 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING
MODEL#: XT2-2; SERIAL#: 05143170; DOM: 12/05; LOT# 1942

SET-UP Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II

Primary Vel. Location : 9.0 ft. From Muzzle Primary Vel. Screens : 6.5 ft., 11.5 ft.

Range No. : 2 Temp. : 69 F

Obliquity : Witness Panel : Backing Material : Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Barrel No./Gun : 357/9-R1 Gunner : CHES BP : RH : 29.85 in. Hg 33%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(2) : (1) : PER-NIJ-STD-0101.04 LEVEL II (ABBREVIATED) PRE-TEST CLAY TEMP: 99.8 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3449	1450	3449	1450	1450	P		DEF. 36mm
2		3221	1552	3225	1550	1551	P	Y	DEF. 45mm
3		3098	1614	3098	1614	1614	C	Y	
4		3171	1577	3171	1577	1577	C	Y	
5		3194	1565	3194	1565	1565	C	Y	
6		3396	1472	3396	1472	1472	P	Y	DEF. 32mm
7		3207	1559	3207	1559	1559	C	Y	
8		3356	1490	3360	1488	1489	C	Y	
9		3401	1470	3405	1468	1469	P		DEF. 47mm
10		3333	1500	3338	1498	1499	P	Y	DEF. 32mm
11		3261	1533	3266	1531	1532	P	Y	DEF. 42mm
12		3122	1602	3122	1602	1602	P	Y	DEF. 44mm

REMARKS :

MAKE-UP: LAYERS 1-8, FLEX ARAMID FILM.
LAYERS 9-13, FLEX WOVEN ARAMID FIBER(34x34).
LAYERS 14-23, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-23, TACK AT TOP CORNERSAND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1546
High Partial : 1602
Low Complete : 1489
Range of Results : 142
Range of Mixed : 113

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/5/11

TEST PANEL

Manufacturer : SAFARILAND Sample No. : CODE 5.1 (FRONT) Size : Heat No. :
LL NA Thicknesses : NA Weight : 1.72 lbs. Avg. Thick. : NA Hardness : NA Required BL(P). :
Plies/Laminates : 13 Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL: SII-6.0; SERIAL#: 01455522; LOT#: 01906045; DOM: 07/24/06

Date Rec'd. : 03/24/11 Via : Federal Express Returned : Federal Express

SET-UP

Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD- 2005 INTERIM Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : CLAY Residual Vel. Screens : NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. :68 F
BP : 29.85 in. Hg RH : 34% Barrel No./Gun : 357/9-R1 Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION

Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3387	1476	3387	1476	1476	P	Y	DEF. 37mm
2		3153	1586	3149	1588	1587	C		
3		3333	1500	3333	1500	1500	C	Y	
4		3378	1480	3369	1484	1482	C	Y	
5		3473	1440	3468	1442	1441	P	Y	DEF. 33mm
6		3387	1476	3383	1478	1477	P	Y	DEF. 31mm
7		3302	1514	3302	1514	1514	C		
8		3378	1480	3378	1480	1480	C	Y	
9		3491	1432	3491	1432	1432	P	Y	DEF. 39mm
10		3365	1486	3365	1486	1486	C	Y	
11		3500	1429	3495	1431	1430	P	Y	DEF. 38mm
12		3405	1468	3401	1470	1469	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-10, 2 PLYFLEX ARAMID FILM. LAYERS 11-13, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING: LAYERS 1-13, TACK AT SHOULDERS AND BOTTOM CENTER. LAYERS 1-10, PINWHEEL STITCH. LAYERS 11-13, X STITCH THROUGH CENTER OF VEST.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1467
High Partial : 1477
Low Complete : 1469
Range of Results : 70
Range of Mixed : 8

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/5/11

TEST PANEL

Manufacturer : SAFARILAND Sample No. : CODE 5.1 (BACK) Size : Heat No. :
LXL NA Thicknesses : NA Weight : 1.91 lbs. Avg. Thick. : NA Hardness : NA Required BL(P). :
Plies/Laminates : 13 Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL: SII-6.0; SERIAL#: 01455529; LOT#: 01906045; DOM: 07/24/06

Date Rec'd. : 03/24/11 Via : Federal Express Returned : Federal Express

SET-UP

Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD- 2005 INTERIM Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. :68 F
BP : 29.85 in. Hg RH : 34% Barrel No./Gun : 357/9-R1 Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION

Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.0 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3432	1457	3432	1457	1457	P	Y	DEF. 38mm
2		3198	1563	3194	1565	1564	C	Y	
3		3320	1506	3315	1508	1507	C	Y	
4		3347	1494	3347	1494	1494	P	Y	DEF. 42mm
5		3315	1508	3311	1510	1509	C	Y	
6		3356	1490	3351	1492	1491	P	Y	DEF. 34mm
7		3329	1502	3329	1502	1502	C	Y	
8		3576	1398	3572	1400	1399	P		DEF. 31mm
9		3414	1465	3410	1466	1465	P	Y	DEF. 37mm
10		3356	1490	3351	1492	1491	C	Y	
11		3441	1453	3437	1455	1454	P		DEF. 37mm
12		3414	1465	3405	1468	1466	P	Y	DEF. 38mm

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-10, 2 PLYFLEX ARAMID FILM. LAYERS 11-13, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING: LAYERS 1-13, TACK AT TOP CORNERS AND BOTTOM CENTER. LAYERS 1-10, PINWHEEL STITCH. LAYERS 11-13, X STITCH THROUGH CENTER OF VEST.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1495
High Partial : 1494
Low Complete : 1491
Range of Results : 107
Range of Mixed : 3

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/6/11

TEST PANEL

Manufacturer : AMERICAN BODY ARMOR
Size : LR
Thicknesses : NA
Avg. Thick. : NA
Sample No. : CODE 6.1 (FRONT)
Heat No. : NA
Weight : 1.48 lbs.
Hardness : NA
Date Rec'd. : 03/25/11 Via : Federal Express Returned : Federal Express

Required BL(P) : Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT2-2; SERIAL#: 06066157; DOM: 06/01/06; LOT# 2343
Plies/Laminates : 23

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : CLAY Residual Vel. Screens :
Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 69 F
BP : 29.72 in. Hg RH : 41%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : L.CHES

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2
APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.8 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3459	1446	3455	1447	1446	P		DEF. 39mm
2		3297	1517	3293	1518	1517	C	Y	
3		3302	1514	3302	1514	1514	C	Y	
4		3333	1500	3338	1498	1499	P	Y	DEF. 45mm
5		3315	1508	3315	1508	1508	C	Y	
6		3437	1455	3432	1457	1456	P		DEF. 42mm
7		3369	1484	3369	1484	1484	P		DEF. 34mm
8		3306	1512	3302	1514	1513	P	Y	DEF. 32mm
9		3243	1542	3243	1542	1542	P	Y	DEF. 45mm
10		3180	1572	3180	1572	1572	P	Y	DEF. 40mm
11		3090	1618	3090	1618	1618	C	Y	
12		3045	1642	3050	1639	1641	C		

REMARKS :

MAKE-UP: LAYERS 1-8, 2 PLY FLEX ARAMID FILM. LAYERS 9-13, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 14-23, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-23, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1535
High Partial : 1572
Low Complete : 1508
Range of Results : 119
Range of Mixed : 64

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/6/11

TEST PANEL

Manufacturer : AMERICAN BODY ARMOR
Size : LRX+3
Thicknesses : NA
Avg. Thick. : NA
Sample No. : CODE 6.1 (BACK)
Heat No. : NA
Weight : 1.84 lbs.
Hardness : NA
Date Rec'd. : 03/25/11 Via : Federal Express Returned : Federal Express

Required BL(P) : Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT2-2; SERIAL#: 06066162; DOM: 06/01/06; LOT# 2343
Plies/Laminates : 23

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : CLAY Residual Vel. Screens : NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F
BP : 29.72 in. Hg RH : 41%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : L.CHES

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 97.2 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3387	1476	3383	1478	1477	C	Y	
2		3554	1407	3554	1407	1407	P		DEF. 39mm
3		3518	1421	3518	1421	1421	P		DEF. 37mm
4		3342	1496	3338	1498	1497	P	Y	DEF. 53mm
5		3297	1517	3298	1516	1516	P	Y	DEF. 47mm
6		3095	1616	3095	1616	1616	C		
7		3288	1521	3288	1521	1521	C	Y	
8		3365	1486	3360	1488	1487	C	Y	
9		3437	1455	3432	1457	1456	P	Y	DEF. 38mm
10		3392	1474	3392	1474	1474	C	Y	
11		3459	1446	3455	1447	1446	P		DEF. 34mm
12		3378	1480	3378	1480	1480	P	Y	DEF. 36mm

REMARKS :

MAKE-UP: LAYERS 1-8, 2 PLY FLEX ARAMID FILM. LAYERS 9-13, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 14-23, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-23, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1488
High Partial : 1516
Low Complete : 1474
Range of Results : 65
Range of Mixed : 42

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/9/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. : AMERICAN BODY ARMOR, INC. XXLS NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 04/14/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 30 NA 2.09 lbs. Sample No. : CODE 7.1 (FRONT)

Description : SEE REMARKS FOR MAKEUP AND STITCHING
MODEL # XT3A-2; SERIAL#: 06045134; DOM: 04/06

SET-UP Shot Spacing : PER-NIJ-STD-0101.04
Obliquity : Witness Panel : Backing Material : Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Primary Vel. Location : 9.0 ft. From Muzzle Primary Vel. Screens : 6.5 ft., 11.5 ft.
Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Range No. : 1 Temp. : 68 F
Barrel No./Gun : 357/9-R1 Gunner : M.GOMEZ BP : RH : 29.71 in. Hg 45%

Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED) PRE-TEST CLAY TEMP: 99.5 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3059	1635	3059	1635	1635	P	Y	DEF. 34mm
2		2888	1731	2888	1731	1731	C	Y	
3		2964	1687	2964	1687	1687	P	Y	DEF. 34mm
4		2928	1708	2928	1708	1708	C	Y	
5		3000	1667	2996	1669	1668	C	Y	
6		3063	1632	3063	1632	1632	P	Y	DEF. 37mm
7		2924	1710	2928	1708	1709	C	Y	
8		3045	1642	3041	1644	1643	C	Y	
9		3158	1583	3158	1583	1583	P	Y	DEF. 41mm
10		3140	1592	3140	1592	1592	P	Y	DEF. 34mm
11		3077	1625	3068	1630	1627	P	Y	DEF. 40mm
12		2978	1679	2978	1679	1679	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-9, 2 PLY FLEX ARAMID FILM. LAYERS 10-16, FLEX WOVEN ARAMID FIBER (32X32). LAYERS 17-30, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-30, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1658
High Partial : 1687
Low Complete : 1643
Range of Results : 148
Range of Mixed : 44

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/9/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. : AMERICAN BODY ARMOR, INC. XXLSL NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 04/14/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 30 NA 2.13 lbs. Sample No. : CODE 7.1 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING
MODEL # XT3A-2; SERIAL#: 06045135; DOM: 04/06

SET-UP Shot Spacing : PER-NIJ-STD-0101.04
Obliquity : Witness Panel : Backing Material : Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Primary Vel. Location : 9.0 ft. From Muzzle Primary Vel. Screens : 6.5 ft., 11.5 ft.
Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Range No. : 1 Temp. : 69 F
Barrel No./Gun : 357/9-R1 Gunner : M.GOMEZ BP : RH : 29.71 in. Hg 40%

Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED) PRE-TEST CLAY TEMP: 98.5 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3036	1647	3036	1647	1647	P	Y	DEF. 43mm
2		2879	1737	2879	1737	1737	C		
3		2987	1674	2982	1677	1675	C	Y	
4		3005	1664	3005	1664	1664	P	Y	DEF. 38mm
5		2996	1669	2996	1669	1669	P	Y	DEF. 47mm
6		2932	1705	2932	1705	1705	C	Y	
7		2996	1669	2991	1672	1670	C	Y	
8		3122	1602	3117	1604	1603	C	Y	
9		3203	1561	3198	1563	1562	P	Y	DEF. 44mm
10		3122	1602	3122	1602	1602	C	Y	
11		3248	1539	3243	1542	1541	P		DEF. 33mm
12		3203	1561	3194	1565	1563	P	Y	DEF. 51mm

REMARKS :

MAKE-UP: LAYERS 1-9, 2 PLY FLEX ARAMID FILM. LAYERS 10-16, FLEX WOVEN ARAMID FIBER (32X32). LAYERS 17-30, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-30, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1636
High Partial : 1669
Low Complete : 1602
Range of Results : 143
Range of Mixed : 67

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/2/11

TEST PANEL

Manufacturer : AMERICAN BODY ARMOR
Size : LR
Thicknesses : NA
Avg. Thick. : NA
Description : SEE REMARKS FOR MAKEUP AND STITCHING
MODEL#: XT2-2; SERIAL#: 05106816; DOM: OCT 2005

Sample No. : CODE 8.1 (FRONT)
Heat No. : NA
Weight : 1.51 lbs.
Hardness : NA
Required BL(P) : Plies/Laminates : 23

Date Rec'd. : 05/20/11 Via : Federal Express Returned : Federal Express

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : CLAY Residual Vel. Screens :
Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. :69 F
BP : 29.71 in. Hg RH : 62%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2
APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.9 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3410	1466	3405	1468	1467	P	Y	DEF. 18mm
2		3144	1590	3140	1592	1591	P	Y	DEF. 30mm
3		3032	1649	3027	1652	1650	C		
4		3158	1583	3158	1583	1583	P	Y	DEF. 35mm
5		3072	1628	3068	1630	1629	C		
6		3185	1570	3180	1572	1571	C	Y	
7		3212	1557	3212	1557	1557	C	Y	
8		3342	1496	3338	1498	1497	P	Y	DEF. 37mm
9		3257	1535	3252	1538	1536	P	Y	DEF. 49mm
10		3158	1583	3153	1586	1585	C	Y	
11		3275	1527	3270	1529	1528	C	Y	
12		3401	1470	3396	1472	1471	C	Y	

REMARKS :
MAKE-UP: LAYERS 1-8, 2 PLY FLEX ARAMID FILM. LAYERS 9-13, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 14-23, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-23, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :
Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :
No. Points : 5 & 5
V50 : 1539
High Partial : 1591
Low Complete : 1471
Range of Results : 124
Range of Mixed : 120

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/2/11

TEST PANEL

Manufacturer : AMERICAN BODY ARMOR
Size : LRL
Thicknesses : NA
Avg. Thick. : NA
Description : SEE REMARKS FOR MAKEUP AND STITCHING
MODEL#: XT2-2; SERIAL#: 05106819; DOM: OCT 2005

Sample No. : CODE 8.1 (BACK)
Heat No. : NA
Weight : 1.52 lbs.
Hardness : NA
Required BL(P) : Plies/Laminates : 23

Date Rec'd. : 05/20/11 Via : Federal Express Returned : Federal Express

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : CLAY Residual Vel. Screens : NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. :69 F
BP : 29.71 in. Hg RH : 62% Barrel No./Gun : 357/9-R1 Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.1 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3437	1455	3432	1457	1456	P		DEF. 34mm
2		3194	1565	3194	1565	1565	P	Y	DEF. 39mm
3		3032	1649	3027	1652	1650	P	Y	DEF. 37mm
4		2933	1705	2928	1708	1706	C		
5		3027	1652	3018	1657	1654	C	Y	
6		3131	1597	3126	1599	1598	C	Y	
7		3221	1552	3212	1557	1554	C	Y	
8		3333	1500	3329	1502	1501	P		DEF. 36mm
9		3243	1542	3239	1544	1543	P	Y	DEF. 59mm
10		3167	1579	3162	1581	1580	C	Y	
11		3261	1533	3257	1535	1534	P		DEF. 46mm
12		3189	1568	3185	1570	1569	P	Y	DEF. 59mm

REMARKS :

MAKE-UP: LAYERS 1-8, 2 PLY FLEX ARAMID FILM. LAYERS 9-13, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 14-23, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-23, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1589
High Partial : 1650
Low Complete : 1554
Range of Results : 111
Range of Mixed : 96

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/2/11

TEST PANEL

Manufacturer : AMERICAN BODY ARMOR
Size : XXLR
Thicknesses : NA
Avg. Thick. : NA
Sample No. : CODE 9.1 (FRONT)
Heat No. : NA
Weight : 2.28 lbs.
Hardness : NA
Date Rec'd. : 03/2411 Via : Federal Express Returned : Federal Express

Required BL(P) : Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: 3A-XT-FS-NS; SERIAL#: 05016970; DOM: 02/05; LOT# NONE Plies/Laminates : 30

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 LEVEL IIIA Primary Vel. Location : 9.0 ft. From Muzzle
Witness Panel : Residual Vel. Screens :
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 2 Temp. : 70 F
BP : 29.59 in. Hg RH : 30%
Barrel No./Gun : 357/9-R2
Gunner : CHES
Recorder : CHES

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 99.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3032	1649	3032	1649	1649	C	Y	
2		3522	1420	3527	1418	1419	P		DEF. 31mm
3		3311	1510	3315	1508	1509	P		DEF. 34mm
4		3144	1590	3149	1588	1589	P		DEF. 37mm
5		3090	1618	3095	1616	1617	P	Y	DEF. 40mm
6		2973	1682	2978	1679	1680	P	Y	DEF. 38mm
7		2825	1770	2825	1770	1770	P	Y	DEF. 38mm
8		2699	1853	2703	1850	1851	C		
9		2829	1767	2829	1767	1767	C		
10		2933	1705	2933	1705	1705	C	Y	
11		3095	1616	3099	1613	1614	C	Y	
12		3293	1518	3297	1517	1517	P		DEF. 51mm

REMARKS :

MAKE-UP: LAYERS 1-9, 2 PLY FLEX ARAMID FILM. LAYERS 10-16, FLEX WOVEN ARAMID FIBER (31X31). LAYERS 17-30, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-30, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 3 & 3
V50 : 1672
High Partial : 1770
Low Complete : 1614
Range of Results : 156
Range of Mixed : 156

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/4/11

TEST PANEL

Manufacturer : AMERICAN BODY ARMOR
Size : XXLRL
Thicknesses : NA
Avg. Thick. : NA
Required BL(P) :
Sample No. : CODE 9.1 (BACK)
Heat No. : NA
Weight : 2.41 lbs.
Hardness : NA
Plies/Laminates : 30
Date Rec'd. : 03/2411 Via : Federal Express Returned : Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: 3A-XT-FS-NS; SERIAL#: 05016971; DOM: 02/05; LOT# NONE

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 LEVEL IIIA Primary Vel. Location : 9.0 ft. From Muzzle
Witness Panel : Residual Vel. Screens :
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F
BP : 29.59 in. Hg RH : 30%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2
APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 99.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2946	1697	2942	1700	1698	P	Y	DEF. 41mm
2		2870	1742	2866	1745	1743	C	Y	
3		2969	1684	2964	1687	1685	C	Y	
4		3015	1658	3010	1661	1660	C	Y	
5		3095	1616	3099	1613	1614	P	Y	DEF. 43mm
6		3090	1618	3086	1620	1619	P	Y	DEF. 41mm
7		2996	1669	3000	1667	1668	P	Y	DEF. 35mm
3		2973	1682	2969	1684	1683	C	Y	
9		3032	1649	3027	1652	1650	C	Y	
10		3117	1604	3113	1606	1605	P	Y	DEF. 30mm
11		2919	1713	2915	1715	1714	C	Y	
12		3110	1608	3105	1610	1609	P	Y	DEF. 32mm

REMARKS :

MAKE-UP: LAYERS 1-9, 2 PLY FLEX ARAMID FILM. LAYERS 10-16, FLEX WOVEN ARAMID FIBER (31X31). LAYERS 17-30, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-30, TACK AT TOP CORNERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1662
High Partial : 1698
Low Complete : 1650
Range of Results : 138
Range of Mixed : 48

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/20/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR
Size : 221715
Thicknesses : NA
Avg. Thick. : NA
Required BL(P) :
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-II 107121; SERIAL#: AL050571381; DOM: 06/16/05; LOT# 1412

Sample No. : CODE 10.1 (FRONT)
Heat No. : NA
Weight : 1.64 lbs.
Hardness : NA
Plies/Laminates : 24

Date Rec'd. : 03/2411 Via : Federal Express Returned : Federal Express

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. :70 F
BP : 29.62 in. Hg RH : 45%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : P.PAYNE

AMMUNITION Projectile : CAL. .30 AP, M2, 166 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2
APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 99.1 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Vel. Loss (ft/s)	V-Strike (ft/s)	Result	Include in V50	Footnotes
1		3473	1440	3473	1440	1440	3	1436	C	Y	
2		3639	1374	3639	1374	1374	3	1371	P		DEF. 32mm
3		3536	1414	3536	1414	1414	3	1411	P		DEF. 34mm
4		3306	1512	3306	1512	1512	3	1509	P	Y	DEF. 42mm
5		3293	1518	3293	1518	1518	3	1515	C	Y	
6		3383	1478	3378	1480	1479	3	1476	P		DEF. 40mm
7		3347	1494	3347	1494	1494	3	1490	P		DEF. 45mm
8		3243	1542	3239	1544	1543	4	1539	C	Y	
9		3333	1500	3329	1502	1501	3	1498	P		DEF. 49mm
10		3266	1531	3261	1533	1532	4	1529	P	Y	DEF. 50mm
11		3239	1544	3234	1546	1545	4	1541	P	Y	DEF. 52mm
12		3144	1590	3144	1590	1590	4	1587	C		

REMARKS :

MAKE-UP: LAYERS 1-24, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-24, 1.25" BOX STITCH. LAYERS 1-24, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 3 & 3
V50 : 1512
High Partial : 1541
Low Complete : 1436
Range of Results : 105
Range of Mixed : 105

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/20/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR
Size : 221715
Thicknesses : NA
Avg. Thick. : NA
Required BL(P) :
Sample No. : CODE 10.1 (BACK)
Heat No. : NA
Weight : 1.44 lbs.
Hardness : NA
Plies/Laminates : 24
Date Rec'd. : 03/2411 Via : Federal Express Returned : Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-II 107121; SERIAL#: AL050571381; DOM: 06/16/05; LOT# 1412

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F
BP : 29.62 in. Hg RH : 43%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 98.0 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3401	1470	3396	1472	1471	P		DEF. 35mm
2		3239	1544	3234	1546	1545	P	Y	DEF. 42mm
3		3126	1599	3126	1599	1599	C	Y	
4		3185	1570	3180	1572	1571	C	Y	
5		3302	1514	3297	1517	1515	P		DEF. 46mm
6		3225	1550	3225	1550	1550	P	Y	DEF. 52mm
7		3050	1639	3050	1639	1639	C	Y	
8		3257	1535	3252	1538	1536	P	Y	DEF. 49mm
9		3198	1563	3198	1563	1563	C	Y	
10		3252	1538	3248	1539	1538	P	Y	DEF. 51mm
11		3203	1561	3203	1561	1561	C	Y	
12		3216	1555	3216	1555	1555	P	Y	DEF. 53mm

REMARKS :

MAKE-UP: LAYERS 1-24, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-24, 1.25" BOX STITCH. LAYERS 1-24, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1566
High Partial : 1555
Low Complete : 1561
Range of Results : 103
Range of Mixed : 0

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/20/11

TEST PANEL

SECOND CHANCE ARMOR T)
BODY 201715 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight :
Hardness : NA 30 NA 1.82
Plies/Laminates : lbs. CODE 11.1
Sample No. : (FRON

Date Rec'd. : Via : Returned : 03/3111
Federal Express Federal
Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: AL070573349; DOM: 07/08/05; LOT# 1411; OFFICER; GUY FALTINOWSKI

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 LEVEL IIIA Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 70 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.65 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 55% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 99.2 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3090	1618	3086	1620	1619	C	Y	
2		3261	1533	3257	1535	1534	P	Y	DEF. 37mm
3		3158	1583	3153	1586	1585	C	Y	
4		3257	1535	3257	1535	1535	P	Y	DEF. 35mm
5		3203	1561	3198	1563	1562	P	Y	DEF. 38mm
6		3108	1609	3104	1611	1610	P	Y	DEF. 41mm
7		3045	1642	3045	1642	1642	C	Y	
8		3104	1611	3099	1613	1612	P	Y	DEF. 44mm
9		3041	1644	3036	1647	1646	P	Y	DEF. 48mm
10		2973	1682	2969	1684	1683	C	Y	
11		2996	1669	2991	1672	1670	C	Y	
12		3113	1606	3113	1606	1606	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1609
High Partial : 1646
Low Complete : 1585
Range of Results : 149
Range of Mixed : 61

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/20/11

TEST PANEL

SECOND CHANCE ARMOR
BODY 201715 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight :
Hardness : NA 30 NA 1.69
Plies/Laminates : lbs. CODE 11.1
Sample No. : (BACK)

Date Rec'd. : Via : Returned : 03/3111
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: AL070573349; DOM: 07/08/05; LOT# 1411; OFFICER; GUY FALTINOWSKI

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 LEVEL IIIA Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 70 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.65 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 55% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 98.1 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3063	1632	3059	1635	1633	P	Y	DEF. 41mm
2		2906	1721	2901	1724	1722	C	Y	
3		2910	1718	2910	1718	1718	C	Y	
4		3059	1635	3050	1639	1637	P	Y	DEF. 42mm
5		2982	1677	2982	1677	1677	C	Y	
6		3014	1659	3005	1664	1661	P	Y	DEF. 44mm
7		2937	1702	2933	1705	1704	C	Y	
8		3081	1623	3077	1625	1624	C	Y	
9		3131	1597	3122	1602	1599	P	Y	DEF. 41mm
10		3077	1625	3072	1628	1626	C	Y	
11		3135	1595	3135	1595	1595	P	Y	DEF. 39mm
12		3081	1623	3081	1623	1623	P	Y	DEF. 43mm

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1652
High Partial : 1661
Low Complete : 1624
Range of Results : 127
Range of Mixed : 37

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/20/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR 221214 NA NA
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: SUM IIIA R02 6010; SERIAL#: 05060878; DOM: 05/23/06; LOT# 1650/1962

Sample No. : CODE 12.1 (FRONT)
Heat No. : NA
Weight : 1.92 lbs.
Hardness : NA
Plies/Laminates : 30

Date Rec'd. : 04/01/11
Via : Federal Express
Returned : Federal Express

SET-UP

Shot Spacing : PER-NIJ-STD-0101.04 LEVEL IIIA
Witness Panel :
Obliquity : CLAY 0 deg. 5.5" CLAY DRY
Backing Material :
Conditioning :

Primary Vel. Screens : 6.5 ft., 11.5 ft. Primary Vel. Location : 9.0 ft. From Muzzle Residual NA Residual Vel. Location : NA
Witness Screens :
Range to Target : 16.4 ft.

Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F
BP : 29.65 in. Hg RH :
55% Barrel No./Gun :
357/9-R1 Gunner :
M.GOMEZ Recorder :
P.PAYNE

AMMUNITION

Projectile : 9mm, FMJ, 124 gr. Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 98.2 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3032	1649	3027	1652	1650	C	Y	
2		3207	1559	3207	1559	1559	P	Y	DEF. 32mm
3		3104	1611	3104	1611	1611	P	Y	DEF. 33mm
4		3036	1647	3032	1649	1648	P	Y	DEF. 34mm
5		2942	1700	2946	1697	1698	C	Y	
6		3005	1664	2996	1669	1666	C	Y	
7		3063	1632	3063	1632	1632	P	Y	DEF. 36mm
8		3023	1654	3023	1654	1654	C	Y	
9		3095	1616	3086	1620	1618	P	Y	DEF. 54mm
10		3009	1662	3005	1664	1663	P	Y	DEF. 35mm
11		2973	1682	2969	1684	1683	C	Y	
12		2946	1697	2942	1700	1698	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1648
High Partial : 1663
Low Complete : 1650
Range of Results : 139
Range of Mixed : 13

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/20/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR 221214 NA NA
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: SUM IIIA R02 6010; SERIAL#: 05060878; DOM: 05/23/06; LOT# 1650/1962

Sample No. : CODE 12.1 (BACK)
Heat No. : NA
Weight : 1.47 lbs.
Hardness : NA
Plies/Laminates : 30

Date Rec'd. : 04/01/11
Via : Federal Express
Returned : Federal Express

SET-UP

Shot Spacing : PER-NIJ-STD-0101.04 LEVEL IIIA
Witness Panel :
Obliquity : CLAY 0 deg. 5.5" CLAY DRY
Backing Material :
Conditioning :

Primary Vel. Screens : 6.5 ft., 11.5 ft. Primary Vel. Location : 9.0 ft. From Muzzle Residual NA Residual Vel. Location : NA
Wit. Screens :
Range to Target : 16.4 ft.

Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F
BP : 29.65 in. Hg RH : 55%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : P.PAYNE

AMMUNITION

Projectile : 9mm, FMJ, 124 gr. Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 97.2 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3036	1647	3032	1649	1648	P	Y	DEF. 35mm
2		2870	1742	2874	1740	1741	C		
3		2942	1700	2942	1700	1700	C	Y	
4		2955	1692	2946	1697	1695	P	Y	DEF. 35mm
5		2969	1684	2973	1682	1683	C	Y	
6		3014	1659	3014	1659	1659	C	Y	
7		3153	1586	3149	1588	1587	C	Y	
8		3203	1561	3198	1563	1562	P	Y	DEF. 37mm
9		3117	1604	3117	1604	1604	P	Y	DEF. 35mm
10		3014	1659	3014	1659	1659	P	Y	DEF. 34mm
11		2955	1692	2955	1692	1692	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations
PANEL SIZE LIMITS TEST TO 11 SHOTS.

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1649
High Partial : 1695
Low Complete : 1587
Range of Results : 138
Range of Mixed : 108

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/29/11

TEST PANEL

Manufacturer : POINT BLANK BODY ARMOR
Size : ML
Thicknesses : NA
Avg. Thick. : NA
Required BL(P) :
Sample No. : CODE 13.1 (FRONT)
Heat No. : NA
Weight : 1.35 lbs.
Hardness : NA
Plies/Laminates : 31
Date Rec'd. : 03/24/11 Via : Federal Express Returned : Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT2-2; SERIAL#: 05116178; DOM: N/A; LOT# N/A; STYLE: N/A

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. :69 F
BP : 29.50 in. Hg RH : 49%
Barrel No./Gun : 357/9-R1
Gunner : TRAUTMAN
Recorder : GOMEZ

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2
APPLICABLE STANDARDS OR PROCEDURES

(1) : NIJ-STD-0101.04
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3554	1407	3549	1409	1408	P		DEF. 38mm
2		3135	1595	3126	1599	1597	P	Y	DEF. 44mm
3		2951	1694	2942	1700	1697	C		
4		3014	1659	3009	1662	1660	P	Y	DEF.45mm
5		2987	1674	2987	1674	1674	C	Y	
6		3023	1654	3018	1657	1655	P	Y	DEF.55mm
7		2978	1679	2978	1679	1679	C	Y	
8		3045	1642	3036	1647	1644	C	Y	
9		3135	1595	3135	1595	1595	C	Y	
10		3167	1579	3171	1577	1578	P	Y	DEF. 37mm
11		3131	1597	3126	1599	1598	P	Y	DEF. 48mm
12		3081	1623	3081	1623	1623	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-16, 2 PLY FLEX ARAMID FILM. LAYERS 17-21, FLEX WOVEN ARAMID FIBER (34X34). LAYERS 22-31, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-31, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1630
High Partial : 1660
Low Complete : 1595
Range of Results : 101
Range of Mixed : 65

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/29/11

TEST PANEL

Manufacturer : POINT BLANK BODY ARMOR
Size : ML
Thicknesses : NA
Avg. Thick. : NA
Sample No. : CODE 13.1 (BACK)
Heat No. : NA
Weight : 1.42 lbs.
Hardness : NA
Date Rec'd. : 03/24/11 Via : Federal Express Returned : Federal Express
Required BL(P) :
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT2-2; SERIAL#: 05116179; DOM: N/A; LOT# N/A; STYLE: N/A
Plies/Laminates : 31

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 71 F
BP : 29.50 in. Hg RH : 40%
Barrel No./Gun : 357/9-R1
Gunner : TRAUTMAN
Recorder : GOMEZ

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2

APPLICABLE STANDARDS OR PROCEDURES

(1) : NIJ-STD-0101.04
(2) : PRE-TEST CLAY TEMP: 97.4 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3545	1410	3549	1409	1410	P		DEF. 39mm
2		3180	1572	3176	1574	1573	P		DEF. 46mm
3		2987	1674	2982	1677	1675	C	Y	
4		3099	1613	3095	1616	1614	P		DEF. 41mm
5		3027	1652	3027	1652	1652	P	Y	DEF. 43mm
6		3027	1652	3023	1654	1653	C	Y	
7		3041	1644	3041	1644	1644	P	Y	DEF. 37mm
8		3000	1667	2996	1669	1668	C	Y	
9		3041	1644	3041	1644	1644	C	Y	
10		3140	1592	3131	1597	1595	P		DEF. 41mm
11		3050	1639	3050	1639	1639	P	Y	DEF. 38mm
12		3050	1639	3045	1642	1641	P	Y	DEF. 58mm

REMARKS :

MAKE-UP: LAYERS 1-16, 2 PLY FLEX ARAMID FILM. LAYERS 17-21, FLEX WOVEN ARAMID FIBER (34X34). LAYERS 22-31, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-31, TACK AT TOP CORNERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1652
High Partial : 1652
Low Complete : 1644
Range of Results : 36
Range of Mixed : 8

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/2/11

TEST PANEL

POINT BLANK BODY MOR T)
ARLR NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight :
Hardness : NA 30 NA 1.79
Plies/Laminates : Sample lbs. CODE 14.1
No. : (FRON

Date Rec'd. : Via : Returned :
03/30/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT3A-2; SERIAL#: 05093811; DOM: 09/01/05: OFFICER: FERNANDO ARAGON: ID#: C10-066059

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 69 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.50 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 49% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER- NIJ-STD-0101.04 LEVEL IIIA
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2960	1689	2960	1689	1689	P	Y	DEF. 34mm
2		2883	1734	2874	1740	1737	C		
3		2955	1692	2955	1692	1692	C		
4		3023	1654	3023	1654	1654	C		
5		3099	1613	3099	1613	1613	C	Y	
6		3162	1581	3162	1581	1581	C	Y	
7		3257	1535	3261	1533	1534	P		DEF. 30mm
8		3140	1592	3135	1595	1594	P	Y	DEF. 36mm
9		3140	1592	3135	1595	1594	P	Y	DEF. 40mm
10		3090	1618	3090	1618	1618	C	Y	
11		3144	1590	3140	1592	1591	P	Y	DEF. 33mm
12		3108	1609	3104	1611	1610	C	Y	

REMARKS :

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1611
High Partial : 1689
Low Complete : 1581
Range of Results : 108
Range of Mixed : 108

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/2/11

TEST PANEL

POINT BLANK BODY MOR
ARLR NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight :
Hardness : NA 30 NA 1.84
Plies/Laminates : Sample No. : lbs. CODE 14.1

Date Rec'd. : Via : Returned : 03/30/11
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT3A-2; SERIAL#: 05093762; DOM: 09/01/05: (BACK)
OFFICER: FERNANDO ARAGON: ID#: C10-066059

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 69 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.50 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 49% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER- NIJ-STD-0101.04 LEVEL IIIA
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3014	1659	3009	1662	1660	P	Y	DEF. 34mm
2		2843	1759	2843	1759	1759	C		
3		2933	1705	2924	1710	1707	C		
4		2969	1684	2969	1684	1684	C	Y	
5		3072	1628	3068	1630	1629	P	Y	DEF. 37mm
6		3050	1639	3050	1639	1639	P	Y	DEF. 39mm
7		2969	1684	2969	1684	1684	C	Y	
8		2955	1692	2951	1694	1693	C	Y	
9		3108	1609	3104	1611	1610	P	Y	DEF. 43mm
10		3027	1652	3027	1652	1652	C	Y	
11		3126	1599	3126	1599	1599	P	Y	DEF. 33mm
12		3054	1637	3050	1639	1638	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-9, 2 PLY FLEX ARAMID FILM. LAYERS 10-16, FLEX WOVEN ARAMID FIBER (32X32). LAYERS 17-30, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-30, TACK AT TOP CORNERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1649
High Partial : 1660
Low Complete : 1638
Range of Results : 94
Range of Mixed : 22

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/6/11

TEST PANEL

Manufacturer : AMERICAN BODY ARMOR
Size : XLR
Thicknesses : NA
Avg. Thick. : NA
Sample No. : CODE 15.1 (FRONT)
Heat No. : NA
Weight : 1.79 lbs.
Hardness : NA
Date Rec'd. : 03/24/11 Via : Federal Express Returned : Federal Express

Required BL(P) : Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT2-2; SERIAL#: 06008535; DOM: 01/01/06; LOT# 1957
Plies/Laminates : 23

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : CLAY Residual Vel. Screens : NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 68 F
BP : 29.72 in. Hg RH : 42%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : L.CHES

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.9 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3405	1468	3401	1470	1469	P		DEF. 28mm
2		3203	1561	3198	1563	1562	P	Y	DEF. 40mm
3		3054	1637	3050	1639	1638	C	Y	
4		3153	1586	3149	1588	1587	P	Y	DEF. 40mm
5		2987	1674	2987	1674	1674	C		
6		3162	1581	3158	1583	1582	C	Y	
7		3194	1565	3194	1565	1565	P	Y	DEF. 33mm
8		3090	1618	3090	1618	1618	C	Y	
9		3099	1613	3095	1616	1614	P	Y	DEF. 56mm
10		3153	1586	3153	1586	1586	C	Y	
11		3180	1572	3180	1572	1572	C	Y	
12		3261	1533	3261	1533	1533	P	Y	DEF. 48mm

REMARKS :

MAKE-UP: LAYERS 1-8, 2 PLY FLEX ARAMID FILM. LAYERS 9-13, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 14-23, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-23, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1586
High Partial : 1614
Low Complete : 1572
Range of Results : 105
Range of Mixed : 42

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/6/11

TEST PANEL

Manufacturer : AMERICAN BODY ARMOR
Size : XLSR
Thicknesses : NA
Avg. Thick. : NA
Sample No. : CODE 15.1 (BACK)
Heat No. : NA
Weight : 1.50 lbs.
Hardness : NA
Date Rec'd. : 03/24/11 Via : Federal Express Returned : Federal Express

Required BL(P) : Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT2-2; SERIAL#: 06008536; DOM: 01/01/06; LOT# 1957
Plies/Laminates : 23

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : CLAY Residual Vel. Screens : NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 69 F
BP : 29.71 in. Hg RH : 40%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : L.CHES

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 97.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3387	1476	3387	1476	1476	P		DEF. 37mm
2		3261	1533	3261	1533	1533	P	Y	DEF. 43mm
3		3036	1647	3032	1649	1648	P	Y	DEF. 40mm
4		3045	1642	3041	1644	1643	C		
5		3104	1611	3104	1611	1611	C		
6		3113	1606	3108	1609	1607	C		
7		3225	1550	3225	1550	1550	C		
8		3293	1518	3293	1518	1518	C	Y	
9		3374	1482	3369	1484	1483	P		DEF. 35mm
10		3306	1512	3306	1512	1512	C	Y	
11		3356	1490	3351	1492	1491	P		DEF. 34mm
12		3405	1468	3401	1470	1469	P		DEF. 42mm

REMARKS :

MAKE-UP: LAYERS 1-8, 2 PLY FLEX ARAMID FILM. LAYERS 9-13, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 14-23, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-23, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 2 & 2
V50 : 1553
High Partial : 1648
Low Complete : 1512
Range of Results : 136
Range of Mixed : 136

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/3/11

TEST PANEL

SECOND CHANCE ARMOR T)
BODY 252217 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight :
Hardness : NA 30 NA 2.06
Plies/Laminates : lbs. CODE 16.1
Sample No. : (FRON

Date Rec'd. : Via : Returned :
03/24/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON.IIIA 107121; SERIAL#: ALII0586079; DOM: 11/09/05; OFFICER: LT.THELEN

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 71 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.80 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 51% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : GOMEZ

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3072	1628	3072	1628	1628	C	Y	
2		3270	1529	3266	1531	1530	P		DEF. 38mm
3		3167	1579	3167	1579	1579	P		DEF. 35mm
4		3036	1647	3032	1649	1648	C	Y	
5		3014	1659	3009	1662	1660	C	Y	
6		3153	1586	3149	1588	1587	P	Y	DEF. 36mm
7		3077	1625	3077	1625	1625	C	Y	
8		3108	1609	3104	1611	1610	P	Y	DEF. 37mm
9		3090	1618	3090	1618	1618	C	Y	
10		3144	1590	3140	1592	1591	P	Y	DEF. 43mm
11		3122	1602	3117	1604	1603	P	Y	DEF. 40mm
12		3090	1618	3090	1618	1618	P	Y	DEF. 43mm

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.
NOTE: BALLISTIC INSERT PANEL WAS NOT IN A REMOVABLE CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1619
High Partial : 1618
Low Complete : 1618
Range of Results : 73
Range of Mixed : 0

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/3/11

TEST PANEL

SECOND CHANCE ARMOR
BODY 252217 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight :
Hardness : NA 30 NA 1.98
Plies/Laminates : lbs. CODE 16.1
Sample No. : (BACK)

Date Rec'd. : Via : Returned : 03/24/11
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: ALII0586079; DOM: 11/09/05; OFFICER: LT.THELEN

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 69 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.86 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 52% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : GOMEZ

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE

NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.7 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3036	1647	3036	1647	1647	P	Y	DEF. 36mm
2		2915	1715	2915	1715	1715	C	Y	
3		3072	1628	3063	1632	1630	C	Y	
4		3122	1602	3117	1604	1603	P		DEF. 47mm
5		3068	1630	3063	1632	1631	C	Y	
6		3077	1625	3072	1628	1626	P	Y	DEF. 37mm
7		3050	1639	3045	1642	1641	C	Y	
8		3135	1595	3131	1597	1596	P		DEF. 40mm
9		3095	1616	3090	1618	1617	P	Y	DEF. 37mm
10		3059	1635	3059	1635	1635	P	Y	DEF. 37mm
11		2973	1682	2973	1682	1682	P	Y	DEF. 55mm
12		2919	1713	2915	1715	1714	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.
NOTE: BALLISTIC INSERT PANEL WAS NOT IN A REMOVABLE CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1654
High Partial : 1682
Low Complete : 1630
Range of Results : 98
Range of Mixed : 52

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/6/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR
Size : 201715
Thicknesses : NA
Avg. Thick. : NA
Required BL(P) :
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-II 107121; SERIAL#: AL080578255; DOM: 08/17/05; LOT# 1421

Sample No. : CODE 17.1 (FRONT)
Heat No. : NA
Weight : 1.56 lbs.
Hardness : NA
Plies/Laminates : 24

Date Rec'd. : 03/24/11 Via : Federal Express Returned : Federal Express

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 66 F
BP : 29.74 in. Hg RH : 44%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : L.CHES

AMMUNITION Projectile : 9mm FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3435	1456	3436	1455	1455	C	Y	
2		3653	1369	3653	1369	1369	P		DEF. 40mm
3		3464	1443	3464	1443	1443	P		DEF. 36mm
4		3360	1488	3356	1490	1489	P		DEF. 39mm
5		3275	1527	3270	1529	1528	P	Y	DEF. 43mm
6		3261	1533	3261	1533	1533	P	Y	DEF. 44mm
7		3158	1583	3153	1586	1585	C	Y	
8		3266	1531	3266	1531	1531	P	Y	DEF. 42mm
9		3162	1581	3158	1583	1582	P	Y	DEF. 63mm
10		3032	1649	3032	1649	1649	C		
11		3167	1579	3162	1581	1580	C	Y	
12		3162	1581	3158	1583	1582	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-24, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-24, 1.25" BOX STITCH. LAYERS 1-24, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1547
High Partial : 1582
Low Complete : 1455
Range of Results : 130
Range of Mixed : 127

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/6/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR
Size : 201715
Thicknesses : NA
Avg. Thick. : NA
Required BL(P) :
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-II 107121; SERIAL#: AL080578255; DOM: 08/17/05; LOT# 1421

Sample No. : CODE 17.1 (BACK)
Heat No. : NA
Weight : 1.45 lbs.
Hardness : NA
Plies/Laminates : 24

Date Rec'd. : 03/24/11 Via : Federal Express Returned : Federal Express

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. :68 F
BP : 29.71 in. Hg RH : 43% Barrel No./Gun : 357/9-R1 Gunner : M.GOMEZ Recorder : L.CHES

AMMUNITION Projectile : 9mm FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.1 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3414	1465	3414	1465	1465	P	Y	DEF. 38mm
2		3207	1559	3203	1561	1560	C	Y	
3		3212	1557	3216	1555	1556	C	Y	
4		3347	1494	3347	1494	1494	P	Y	DEF. 36mm
5		3243	1542	3239	1544	1543	P	Y	DEF. 42mm
6		3212	1557	3207	1559	1558	C	Y	
7		3275	1527	3270	1529	1528	C	Y	
8		3432	1457	3432	1457	1457	P	Y	DEF. 40mm
9		3351	1492	3351	1492	1492	C	Y	
10		3333	1500	3329	1502	1501	C	Y	
11		3320	1506	3320	1506	1506	P	Y	DEF. 44mm
12		3509	1425	3504	1427	1426	P	Y	DEF. 43mm

REMARKS :

MAKE-UP: LAYERS 1-24, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-24, 1.25" BOX STITCH. LAYERS 1-24, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1507
High Partial : 1543
Low Complete : 1492
Range of Results : 134
Range of Mixed : 51

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/2/11

TEST PANEL

Manufacturer : P.A.C.A. BODY ARMOR
Size :
Thicknesses : CNCMD+1+0, CNCMD+1+6 NA
Heat No. : Weight : NA 2.07 lbs. Sample No. : CODE 18.1 (FRONT)
Date Rec'd. : 03/31/11 Via : Federal Express Returned : Federal Express

Avg. Thick. : NA
Hardness : NA
Required BL(P) :
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: 4KGS3A; SERIAL#: RC477277; DOM: 05/06; LOT#; 1840,1005G,0104ST
Plies/Laminates : 29

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.

Shot Spacing : PER-NIJ-STD- 2005 INTERIM Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. :69 F
BP : 29.97 in. Hg RH : 56% Barrel No./Gun : 357/9-R1 Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3023	1654	3023	1654	1654	P		DEF. 40mm
2		2865	1745	2861	1748	1746	P	Y	DEF. 46mm
3		2753	1816	2748	1820	1818	C		
4		2829	1767	2825	1770	1769	P	Y	DEF. 46mm
5		2766	1808	2762	1810	1809	C	Y	
6		2834	1764	2829	1767	1766	C	Y	
7		2892	1729	2883	1734	1732	P	Y	DEF. 37mm
8		2870	1742	2870	1742	1742	P	Y	DEF. 25mm
9		2798	1787	2793	1790	1789	C	Y	
10		2861	1748	2856	1751	1749	C	Y	
11		2924	1710	2924	1710	1710	C	Y	
12		2964	1687	2964	1687	1687	P	Y	DEF. 43mm

REMARKS :

MAKE-UP: LAYERS 1-5, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 6-17, 2 PLY FLEX ARAMID FILM. LAYERS 18-28, FLEX POLYETHYLENE FILM. LAYER 29, 3 MM FOAM.
STITCHING: LAYERS 1-8, 2" DIAMOND QUILT STITCH. LAYERS 1-28, TACK AT UPPER SIDES AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1750
High Partial : 1769
Low Complete : 1710
Range of Results : 122
Range of Mixed : 59

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/2/11

TEST PANEL

Manufacturer : P.A.C.A. BODY ARMOR
Size :
Thicknesses : CNCMD+1+0, CNCMD+1+6 NA
Heat No. : Weight : NA 1.89 lbs. Sample No. : CODE 18.1 (BACK)
Date Rec'd. : 03/31/11 Via : Federal Express Returned : Federal Express

Avg. Thick. : NA
Hardness : NA
Required BL(P) :
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: 4KGS3A; SERIAL#: RC477277; DOM: 05/06; LOT#; 1840,1005G,0104ST
Plies/Laminates : 29

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.

Shot Spacing : PER-NIJ-STD- 2005 INTERIM Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. :69 F
BP : 29.97 in. Hg RH : 56% Barrel No./Gun : 357/9-R1 Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA
(2) : PRE-TEST CLAY TEMP: 98.0 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3054	1637	3050	1639	1638	P	Y	DEF. 39mm
2		2820	1773	2816	1776	1774	P	Y	DEF. 50mm
3		2762	1810	2766	1808	1809	C		
4		2820	1773	2820	1773	1773	C	Y	
5		2820	1773	2816	1776	1774	C	Y	
6		2906	1721	2906	1721	1721	C	Y	
7		3018	1657	3014	1659	1658	C	Y	
8		3072	1628	3068	1630	1629	P		DEF. 35mm
9		3005	1664	3000	1667	1665	P	Y	DEF. 45mm
10		2919	1713	2919	1713	1713	P	Y	DEF. 42mm
11		2892	1729	2892	1729	1729	P	Y	DEF. 40mm
12		2816	1776	2811	1779	1777	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-5, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 6-17, 2 PLY FLEX ARAMID FILM. LAYERS 18-28, FLEX POLYETHYLENE FILM. LAYER 29, 3 MM FOAM.
STITCHING: LAYERS 1-8, 2" DIAMOND QUILT STITCH. LAYERS 1-28, TACK AT UPPER SIDES AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1722
High Partial : 1774
Low Complete : 1658
Range of Results : 139
Range of Mixed : 116

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/4/11

TEST PANEL

SECOND CHANCE ARMOR, T)
BODY 221715 NA NA INC.

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. :
Weight :
Hardness : NA 30 NA 2.11
Plies/Laminates : lbs. CODE 19.1
Sample No. : (FRON

Date Rec'd. : Via : Returned :
03/24/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: AL120589445; DOM: 12/28/05; OFFICER: LEBLANC

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.74 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 54% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.2 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3000	1667	3000	1667	1667	P	Y	DEF. 39mm
2		2802	1784	2802	1784	1784	C		
3		2942	1700	2942	1700	1700	C	Y	
4		2996	1669	2991	1672	1670	P	Y	DEF. 38mm
5		2879	1737	2874	1740	1738	P	Y	DEF. 39mm
6		2865	1745	2865	1745	1745	C		
7		2973	1682	2969	1684	1683	C	Y	
8		2999	1667	2994	1670	1669	C	Y	
9		3072	1628	3072	1628	1628	P	Y	DEF. 41mm
10		2987	1674	2987	1674	1674	P	Y	DEF. 35mm
11		2928	1708	2928	1708	1708	C	Y	
12		3027	1652	3018	1657	1654	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1679
High Partial : 1738
Low Complete : 1654
Range of Results : 110
Range of Mixed : 84

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/4/11

TEST PANEL

SECOND CHANCE ARMOR,
BODY 221715 NA NA INC.

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. :
Weight :
Hardness : NA 30 NA 2.11
Plies/Laminates : lbs. CODE 19.1
Sample No. : (BACK)

Date Rec'd. : Via : Returned : 03/24/11
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: AL120589445; DOM: 12/28/05; OFFICER: LEBLANC

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.74 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 54% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3005	1664	3005	1664	1664	P	Y	DEF. 40mm
2		2879	1737	2879	1737	1737	C	Y	
3		2964	1687	2964	1687	1687	P	Y	DEF. 39mm
4		2865	1745	2861	1748	1746	C	Y	
5		2982	1677	2978	1679	1678	P	Y	DEF. 44mm
6		2915	1715	2910	1718	1717	C	Y	
7		3009	1662	3005	1664	1663	P	Y	DEF. 44mm
8		2969	1684	2973	1682	1683	C	Y	
9		3000	1667	3000	1667	1667	C	Y	
10		3108	1609	3108	1609	1609	P	Y	DEF. 38mm
11		3018	1657	3014	1659	1658	P	Y	DEF. 42mm
12		3000	1667	3000	1667	1667	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1681
High Partial : 1687
Low Complete : 1667
Range of Results : 137
Range of Mixed : 20

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/4/11

TEST PANEL

SECOND CHANCE ARMOR, T)
BODY 201715 NA NA INC.

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. :
Weight :
Hardness : NA 30 NA 1.86
Plies/Laminates : lbs. CODE 19.2
Sample No. : (FRON

Date Rec'd. : Via : Returned :
03/24/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: AL080577723; DOM: 08/12/05; LOT#: 1433; OFFICER: TIMMI

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 69 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.77 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 52% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.0 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3005	1664	3009	1662	1663	C	Y	
2		3144	1590	3135	1595	1593	P	Y	DEF. 36mm
3		3090	1618	3086	1620	1619	P	Y	DEF. 37mm
4		2996	1669	2996	1669	1669	C	Y	
5		3108	1609	3108	1609	1609	P	Y	DEF. 37mm
6		3000	1667	2996	1669	1668	P	Y	DEF. 36mm
7		2955	1692	2955	1692	1692	C	Y	
8		3032	1649	3027	1652	1650	C	Y	
9		3063	1632	3063	1632	1632	P	Y	DEF. 42mm
10		3009	1662	3005	1664	1663	C	Y	
11		3113	1606	3113	1606	1606	C	Y	
12		3122	1602	3122	1602	1602	P	Y	DEF. 42mm

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1639
High Partial : 1668
Low Complete : 1606
Range of Results : 99
Range of Mixed : 62

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/4/11

TEST PANEL

SECOND CHANCE ARMOR,
BODY 201715 NA NA INC.

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. :
Weight :
Hardness : NA 30 NA 1.71
Plies/Laminates : lbs. CODE 19.2
Sample No. : (BACK)

Date Rec'd. : Via : Returned : 03/24/11
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: AL080577723; DOM: 08/12/05; LOT#: 1433; OFFICER: TIMMI

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 69 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.77 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 52% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 96.8 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3023	1654	3014	1659	1656	P	Y	DEF. 33mm
2		2870	1742	2865	1745	1744	C	Y	
3		2969	1684	2969	1684	1684	P	Y	DEF. 36mm
4		2883	1734	2874	1740	1737	C	Y	
5		2996	1669	2991	1672	1670	P	Y	DEF. 40mm
6		2969	1684	2964	1687	1685	P	Y	DEF. 40mm
7		2915	1715	2910	1718	1717	C	Y	
8		3005	1664	2996	1669	1666	C	Y	
9		3054	1637	3050	1639	1638	P	Y	DEF. 48mm
10		3018	1657	3014	1659	1658	C	Y	
11		3099	1613	3095	1616	1614	C	Y	
12		3122	1602	3117	1604	1603	P	Y	DEF. 45mm

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1673
High Partial : 1685
Low Complete : 1614
Range of Results : 141
Range of Mixed : 71

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/4/11

TEST PANEL

SECOND CHANCE ARMOR, T)
BODY 222014 NA NA INC.

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. :
Weight :
Hardness : NA 30 NA 1.84
Plies/Laminates : lbs. CODE 19.3
Sample No. : (FRON

Date Rec'd. : Via : Returned :
03/24/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: AL100584656; DOM: 10/27/05; LOT#: 1503; OFFICER: K.HYDE

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.77 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 48% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3045	1642	3041	1644	1643	P	Y	DEF. 34mm
2		2924	1710	2919	1713	1711	C		
3		3005	1664	2996	1669	1666	C	Y	
4		3054	1637	3050	1639	1638	P	Y	DEF. 38mm
5		2937	1702	2933	1705	1704	C	Y	
6		3045	1642	3036	1647	1644	C	Y	
7		3167	1579	3162	1581	1580	C	Y	
8		3216	1555	3216	1555	1555	P		DEF. 36mm
9		3140	1592	3140	1592	1592	P	Y	DEF. 48mm
10		3059	1635	3054	1637	1636	C	Y	
11		3167	1579	3167	1579	1579	P	Y	DEF. 36mm
12		3117	1604	3117	1604	1604	P	Y	DEF. 47mm

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1629
High Partial : 1643
Low Complete : 1580
Range of Results : 125
Range of Mixed : 63

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/4/11

TEST PANEL

SECOND CHANCE ARMOR,
BODY 222014 NA NA INC.

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. :
Weight :
Hardness : NA 30 NA 1.75
Plies/Laminates : lbs. CODE 19.3
Sample No. : (BACK)

Date Rec'd. : Via : Returned : 03/24/11
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA 107121; SERIAL#: AL100584656; DOM: 10/27/05; LOT#: 1503; OFFICER: K.HYDE

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.77 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 48% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 97.8 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3054	1637	3050	1639	1638	P	Y	DEF. 39mm
2		2910	1718	2906	1721	1719	C	Y	
3		2969	1684	2964	1687	1685	C	Y	
4		3068	1630	3059	1635	1632	C	Y	
5		3099	1613	3099	1613	1613	P	Y	DEF. 39mm
6		3090	1618	3086	1620	1619	P	Y	DEF. 39mm
7		2969	1684	2960	1689	1687	C	Y	
8		3104	1611	3099	1613	1612	P	Y	DEF. 37mm
9		3045	1642	3041	1644	1643	C	Y	
10		3113	1606	3113	1606	1606	P	Y	DEF. 39mm
11		3041	1644	3036	1647	1646	C	Y	
12		3081	1623	3077	1625	1624	P	Y	DEF. 47mm

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1644
High Partial : 1638
Low Complete : 1632
Range of Results : 113
Range of Mixed : 6

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/29/11

TEST PANEL

Manufacturer : POINT BLANK BODY ARMOR VINC XLtoto NA
Size : NA
Thicknesses :
Avg. Thick. :
Required BL(P). :
Heat No. : Weight : T)
Hardness : NA 20 NA 2.06 lbs. CODE 20.1
Plies/Laminates : Sample No. : (FRON
Date Rec'd. : Via : Returned : 04/07/11 Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: RTGS2; SERIAL#: 465163; DOM: 02-06; LOT# 51130377 0805g 0106ft; STYLE: N/A

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 71 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.53 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 41% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : TRAUTMAN Recorder : GOMEZ

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : NIJ-STD-0101.04
(2) : PRE-TEST CLAY TEMP: 98.8 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3509	1425	3504	1427	1426	P		DEF. 36mm
2		3185	1570	3180	1572	1571	P	Y	DEF. 49mm
3		2987	1674	2987	1674	1674	C	Y	
4		3158	1583	3158	1583	1583	C	Y	
5		3203	1561	3198	1563	1562	C	Y	
6		3279	1525	3279	1525	1525	P		DEF. 45mm
7		3243	1542	3243	1542	1542	P	Y	DEF. 37mm
8		3203	1561	3198	1563	1562	P	Y	DEF. 43mm
9		3198	1563	3189	1568	1566	P	Y	DEF. 56mm
10		3131	1597	3131	1597	1597	P	Y	DEF. 42mm
11		3086	1620	3086	1620	1620	C	Y	
12		3135	1595	3131	1597	1596	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-3, FLEX WOVEN ARAMID FIBER (26 X 11). LAYERS 4-12, 2 PLY FLEX ARAMID FILM. LAYERS 13-20, FLEX POLYETHYLENE FILM. STITCHING: LAYERS 1-20, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1587
High Partial : 1597
Low Complete : 1562
Range of Results : 132
Range of Mixed : 35

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/29/11

TEST PANEL

Manufacturer : POINT BLANK BODY
Size : ARMOR VINC XLtoto NA
Thicknesses : NA
Avg. Thick. :
Required BL(P). :

Heat No. : Weight :
Hardness : NA 20 NA 1.59
Plies/Laminates : Sample No. : lbs. CODE 20.1 (BACK)

Date Rec'd. : Via : Returned : 04/07/11 Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: RTCS2; SERIAL#: 465163; DOM: 02-06; LOT# 51130377 0805g 0106ft; STYLE: N/A

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 71 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.54 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 41% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : TRAUTMAN Recorder : GOMEZ

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : NIJ-STD-0101.04
(2) : PRE-TEST CLAY TEMP: 97.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3540	1412	3540	1412	1412	P		DEF. 38mm
2		3185	1570	3185	1570	1570	C	Y	
3		3342	1496	3342	1496	1496	P		DEF. 42mm
4		3248	1539	3239	1544	1542	C	Y	
5		3369	1484	3369	1484	1484	P		DEF. 43mm
6		3320	1506	3315	1508	1507	C	Y	
7		3374	1482	3315	1508	1495	P		DEF. 47mm
8		3297	1517	3293	1518	1517	P	Y	DEF. 42mm
9		3243	1542	3239	1544	1543	P	Y	DEF. 58mm
10		3171	1577	3171	1577	1577	P	Y	DEF. 53mm
11		3140	1592	3135	1595	1594	C	Y	
12		3162	1581	3162	1581	1581	P	Y	DEF. 44mm

REMARKS :

MAKE-UP: LAYERS 1-3, FLEX WOVEN ARAMID FIBER (26 X 11). LAYERS 4-12, 2 PLY FLEX ARAMID FILM. LAYERS 13-20, FLEX POLYETHYLENE FILM. STITCHING: LAYERS 1-20, TACK AT TOP CORNERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1554
High Partial : 1581
Low Complete : 1507
Range of Results : 87
Range of Mixed : 74

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/29/11

TEST PANEL

Manufacturer : POINT BLANK BODY ARMOR
Size : 202016
Thicknesses : NA
Avg. Thick. : NA
Required BL(P) :
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-II 107121; SERIAL#: 02050069; DOM: N/A; LOT# N/A; STYLE: N/A

Sample No. : CODE 21.1 (FRONT)
Heat No. : NA
Weight : 1.68 lbs.
Hardness : NA
Plies/Laminates : 24

Date Rec'd. : 03/30/11 Via : Federal Express Returned : Federal Express

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. :70 F
BP : 29.59 in. Hg RH : 44%
Barrel No./Gun : 357/9-R1
Gunner : TRAUTMAN
Recorder : GOMEZ

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2
APPLICABLE STANDARDS OR PROCEDURES

(1) : NIJ-STD-0101.04
(2) : PRE-TEST CLAY TEMP: 99.2 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3495	1431	3491	1432	1431	P		DEF. 34mm
2		3167	1579	3162	1581	1580	C	Y	DEF. 38mm
3		3360	1488	3360	1488	1488	P		DEF. 38mm
4		3257	1535	3257	1535	1535	P		DEF. 40mm
5		3239	1544	3239	1544	1544	P		DEF. 48mm
6		3203	1561	3203	1561	1561	P	Y	DEF. 41mm
7		3117	1604	3113	1606	1605	C	Y	
8		3185	1570	3185	1570	1570	P	Y	DEF. 46mm
9		3095	1616	3095	1616	1616	P	Y	DEF. 54mm
10		3140	1592	3140	1592	1592	P	Y	DEF. 33mm
11		2960	1689	2960	1689	1689	C	Y	
12		3081	1623	3072	1628	1625	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-24, FLEX WOVEN ARAMID FIBER (25X25).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-10, 1.25" BOX STITCH. LAYERS 1-24, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1605
High Partial : 1616
Low Complete : 1580
Range of Results : 128
Range of Mixed : 36

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/29/11

TEST PANEL

Manufacturer : POINT BLANK BODY ARMOR
Size : 202016
Thicknesses : NA
Avg. Thick. : NA
Sample No. : CODE 21.1 (BACK)
Heat No. : NA
Weight : 1.78 lbs.
Hardness : NA
Date Rec'd. : 03/30/11 Via : Federal Express Returned : Federal Express
Required BL(P) :
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-II 107121; SERIAL#: 02050069; DOM: N/A; LOT# N/A; STYLE: N/A
Plies/Laminates : 24

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : Residual Vel. Screens
CLAY NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 71 F
BP : 29.60 in. Hg RH : 45%
Barrel No./Gun : 357/9-R1
Gunner : TRAUTMAN
Recorder : GOMEZ

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2
APPLICABLE STANDARDS OR PROCEDURES

(1) : NIJ-STD-0101.04
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3450	1449	3446	1451	1450	P		DEF. 38mm
2		3189	1568	3185	1570	1569	C	Y	
3		3347	1494	3342	1496	1495	P		DEF. 36mm
4		3212	1557	3207	1559	1558	P	Y	DEF. 47mm
5		3198	1563	3194	1565	1564	P	Y	DEF. 44mm
6		3117	1604	3113	1606	1605	P	Y	DEF. 46mm
7		3099	1613	3095	1616	1614	C	Y	
8		3176	1574	3171	1577	1576	C	Y	
9		3212	1557	3212	1557	1557	P	Y	DEF. 44mm
10		3077	1625	3077	1625	1625	C	Y	
11		3140	1592	3135	1595	1594	P	Y	DEF. 40mm
12		3027	1652	3023	1654	1653	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-24, FLEX WOVEN ARAMID FIBER (25X25).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-10, 1.25" BOX STITCH. LAYERS 1-24, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1592
High Partial : 1605
Low Complete : 1569
Range of Results : 96
Range of Mixed : 36

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/2/11

TEST PANEL

Manufacturer : AMERICAN BODY ARMOR
Size : XLR
Thicknesses : NA
Avg. Thick. : NA
Sample No. : CODE 22.1 (FRONT)
Heat No. : NA
Weight : 1.68 lbs.
Hardness : NA
Date Rec'd. : 03/28/11 Via : Federal Express Returned : Federal Express

Required BL(P) : Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT2-2; SERIAL#: 05084696; DOM: 08/01/05; LOT# 1431
Plies/Laminates : 23

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.
Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : CLAY Residual Vel. Screens :
Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 68 F
BP : 29.94 in. Hg RH : 50%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2
APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II
(2) : PRE-TEST CLAY TEMP: 98.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3419	1462	3419	1462	1462	P		DEF. 36mm
2		3315	1508	3315	1508	1508	P	Y	DEF. 45mm
3		3185	1570	3189	1568	1569	C	Y	
4		3270	1529	3266	1531	1530	C	Y	
5		3320	1506	3315	1508	1507	P	Y	DEF. 44mm
6		3302	1514	3297	1517	1515	C	Y	
7		3306	1512	3302	1514	1513	C	Y	
8		3477	1438	3473	1440	1439	P		DEF. 44mm
9		3365	1486	3365	1486	1486	P	Y	DEF. 52mm
10		3333	1500	3329	1502	1501	C	Y	
11		3374	1482	3374	1482	1482	P	Y	DEF. 37mm
12		3266	1531	3266	1531	1531	P	Y	DEF. 36mm

REMARKS :

MAKE-UP: LAYERS 1-8, 2 PLY FLEX ARAMID FILM. LAYERS 9-13, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 14-23, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-23, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1514
High Partial : 1531
Low Complete : 1501
Range of Results : 87
Range of Mixed : 30

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/2/11

TEST PANEL

Manufacturer : AMERICAN BODY ARMOR
Size : XLRX+1
Thicknesses : NA
Avg. Thick. : NA
Required BL (P) :

Sample No. : CODE 22.1 (BACK)
Heat No. : NA
Weight : 1.98 lbs.
Hardness : NA
Plies/Laminates : 23

Date Rec'd. : 03/28/11 Via : Federal Express Returned : Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: XT2-2; SERIAL#: 05084697; DOM: 08/01/05; LOT# 1431

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft.

Shot Spacing : PER-NIJ-STD-0101.04 Primary Vel. Location : 9.0 ft. From Muzzle Witness Panel : CLAY Residual Vel. Screens : NA Obliquity : 0 deg. Residual Vel. Location : NA Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Conditioning : DRY Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 68 F
BP : 29.94 in. Hg RH : 50%
Barrel No./Gun : 357/9-R1
Gunner : M.GOMEZ
Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL II
(2) : PRE-TEST CLAY TEMP: 97.8 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3482	1436	3477	1438	1437	P		DEF. 37mm
2		3230	1548	3225	1550	1549	C	Y	
3		3360	1488	3360	1488	1488	P		DEF. 36mm
4		3320	1506	3315	1508	1507	P	Y	DEF. 44mm
5		3221	1552	3216	1555	1554	P	Y	DEF. 44mm
6		3167	1579	3167	1579	1579	P	Y	DEF. 35mm
7		3072	1628	3068	1630	1629	C	Y	
8		3176	1574	3171	1577	1576	C	Y	
9		3243	1542	3243	1542	1542	P	Y	DEF. 38mm
10		3189	1568	3185	1570	1569	C	Y	
11		3279	1525	3279	1525	1525	C	Y	
12		3324	1504	3320	1506	1505	P	Y	DEF. 37mm

REMARKS :

MAKE-UP: LAYERS 1-8, 2 PLY FLEX ARAMID FILM. LAYERS 9-13, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 14-23, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-23, TACK AT TOP CORNERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1554
High Partial : 1579
Low Complete : 1525
Range of Results : 124
Range of Mixed : 54

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/13/11

TEST PANEL

POINT BLANK BODY MOR T)
AR48 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight :
Hardness : NA 24 NA 1.73
Plies/Laminates : Sample lbs. CODE 23.1
No. : (FRON

Date Rec'd. : Via : Returned :
03/23/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: H17.5; SERIAL#: 0601390688; DOM: N/A; LOT# CB7121; STYLE: LEH7D1F

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-2005 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 71 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.59 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 41% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-2005 LEVEL II (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3077	1625	3077	1625	1625	P	Y	DEF. 41mm
2		2861	1748	2856	1751	1749	C	Y	
3		2991	1672	2991	1672	1672	P	Y	DEF. 35mm
4		2942	1700	2937	1702	1701	P	Y	DEF. 55mm
5		2870	1742	2861	1748	1745	C	Y	
6		2937	1702	2933	1705	1704	P	Y	DEF. 41mm
7		2865	1745	2861	1748	1746	C	Y	
8		2933	1705	2924	1710	1707	P	Y	DEF. 55mm
9		2888	1731	2883	1734	1733	C	Y	
10		2942	1700	2942	1700	1700	C	Y	
11		2991	1672	2991	1672	1672	P	Y	DEF. 44mm
12		2951	1694	2946	1697	1696	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-10, 2 PLY FLEX ARAMID FILM. LAYERS 11-14, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 15-24, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-24, TACK AT TOP CORNERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1704
High Partial : 1707
Low Complete : 1696
Range of Results : 124
Range of Mixed : 11

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 4/13/11

TEST PANEL

POINT BLANK BODY MOR
AR48 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : NA 24 NA 1.90
Hardness : lbs. CODE 23.1
Plies/Laminates : Sample No. : (BACK)

Date Rec'd. : Via : Returned : 03/23/11
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: H17.5; SERIAL#: 0601390641; DOM: N/A; LOT# CB7121; STYLE: LEH7D1B

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-2005 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 71 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.59 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 41% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-2005 LEVEL II (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 97.7 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3081	1623	3077	1625	1624	C	Y	
2		3234	1546	3230	1548	1547	P		DEF. 35mm
3		3144	1590	3140	1592	1591	C	Y	
4		3176	1574	3176	1574	1574	P		DEF. 40mm
5		3081	1623	3081	1623	1623	C	Y	
6		3194	1565	3189	1568	1567	P		DEF. 36mm
7		3158	1583	3153	1586	1585	P		DEF. 39mm
8		3095	1616	3090	1618	1617	P	Y	DEF. 45mm
9		2998	1668	2998	1668	1668	C	Y	
10		3072	1628	3068	1630	1629	P	Y	DEF. 35mm
11		3032	1649	3027	1652	1650	P	Y	DEF. 45mm
12		2987	1674	2987	1674	1674	P	Y	DEF. 67mm

REMARKS :

MAKE-UP: LAYERS 1-10, 2 PLY FLEX ARAMID FILM. LAYERS 11-14, FLEX WOVEN ARAMID FIBER (36X36). LAYERS 15-24, FLEX POLYETHYLENE FILM.
STITCHING: LAYERS 1-24, TACK AT TOP CORNERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1634
High Partial : 1674
Low Complete : 1591
Range of Results : 83
Range of Mixed : 83

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/3/11

TEST PANEL

SECOND CHANCE ARMOR T)
BODY 22X16 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight :
Hardness : NA 34 NA 2.46
Plies/Laminates : lbs. CODE 24.1
Sample No. : (FRON

Date Rec'd. : Via : Returned :
04/05/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA++305020; SERIAL#: -NYPD-13484; DOM: 09/06: OFFICER: SERGE JEAN-BAPTISTE

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-2005 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 69 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.80 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 55% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : GOMEZ

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE

NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.9 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3009	1662	3005	1664	1663	P	Y	DEF. 47mm
2		2847	1756	2847	1756	1756	C	Y	
3		2960	1689	2960	1689	1689	P	Y	DEF. 39mm
4		2928	1708	2928	1708	1708	C	Y	
5		2955	1692	2951	1694	1693	C	Y	
6		3000	1667	2996	1669	1668	C	Y	
7		3023	1654	3023	1654	1654	P	Y	DEF. 38mm
8		2973	1682	2969	1684	1683	P	Y	DEF. 46mm
9		2946	1697	2946	1697	1697	C	Y	
10		3032	1649	3027	1652	1650	P	Y	DEF. 35mm
11		2951	1694	2946	1697	1696	P	Y	DEF. 39mm
12		2955	1692	2951	1694	1693	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-34, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-20, 1.25" DIAMOND QUILT STITCH. LAYERS 21-34, 1.25" BOX STITCH. LAYERS 1-34, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1688
High Partial : 1696
Low Complete : 1668
Range of Results : 106
Range of Mixed : 28

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 5/3/11

TEST PANEL

SECOND CHANCE ARMOR
BODY 20X16 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight :
Hardness : NA 34 NA 2.42
Plies/Laminates : lbs. CODE 24.1
Sample No. : (BACK)

Date Rec'd. : Via : Returned : 04/05/11
Federal Express Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON IIIA++305020; SERIAL#: -NYPD-13484; DOM: 09/06: OFFICER: SERGE JEAN-BAPTISTE

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 1 Shot Spacing : PER-NIJ-STD-2005 Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 73 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.80 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 54% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : GOMEZ

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE

NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3081	1623	3077	1625	1624	P	Y	DEF. 36mm
2		2955	1692	2955	1692	1692	C	Y	
3		2978	1679	2978	1679	1679	P	Y	DEF. 33mm
4		2919	1713	2915	1715	1714	C	Y	
5		2969	1684	2969	1684	1684	P	Y	DEF. 38mm
6		2982	1677	2878	1737	1707	C	Y	
7		3027	1652	3023	1654	1653	P	Y	DEF. 34mm
8		2955	1692	2955	1692	1692	C	Y	
9		2960	1689	2955	1692	1691	C	Y	
10		3041	1644	3041	1644	1644	P	Y	DEF. 40mm
11		3005	1664	3000	1667	1665	P	Y	DEF. 35mm
12		2955	1692	2955	1692	1692	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-34, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-20, 1.25" DIAMOND QUILT STITCH. LAYERS 21-34, 1.25" BOX STITCH. LAYERS 1-34, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1678
High Partial : 1684
Low Complete : 1691
Range of Results : 90
Range of Mixed : 0

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/10/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR, INC. 202014 NA NA

Size :

Thicknesses :

Avg. Thick. :

Required BL(P). : . Plies/Laminates : 30

Sample No. : CODE 25.1 (FRONT)

Heat No. : NA

Weight : 1.75 lbs.

Hardness : N/A

Date Rec'd. : 06/03/11

Via : Federal Express

Returned : Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-IIIA 107121; SERIAL#: AL03561072; DOM: 03/23/05; OFFICER: EDDIE CALDWELL; LOT# 1358

SET-UP

Shot Spacing : PER-NIJ-STD-0101.04

Witness Panel :

Obliquity : CLAY 0 deg. 5.5"

Backing Material : CLAY DRY

Conditioning :

Primary Vel. Screens : 6.5 ft., 11.5 ft. Primary Vel. Location : 9.0 ft. From Muzzle Residual Vel. Screens : NA Residual Vel. Location : NA

Range to Target : 16.4 ft.

Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F

BP : 29.74 in. Hg RH : 50%

Barrel No./Gun : 357/9-R1

Gunner : M.GOMEZ

Recorder : P.PAYNE

AMMUNITION

Projectile : 9mm, FMJ, 124 gr.

Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)

(2) : PRE-TEST CLAY TEMP: 98.5 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3005	1664	3009	1662	1663	P	Y	DEF. 37mm
2		2928	1708	2928	1708	1708	C	Y	
3		2964	1687	2960	1689	1688	C	Y	
4		3077	1625	3077	1625	1625	P	Y	DEF. 36mm
5		3014	1659	3014	1659	1659	C	Y	
6		3122	1602	3122	1602	1602	P	Y	DEF. 39mm
7		3054	1637	3054	1637	1637	C	Y	
8		3126	1599	3131	1597	1598	P	Y	DEF. 48mm
9		3077	1625	3077	1625	1625	C	Y	
10		3153	1586	3153	1586	1586	P	Y	DEF. 36mm
11		3072	1628	3072	1628	1628	C	Y	
12		3185	1570	3189	1568	1569	P	Y	DEF. 41mm

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1632
High Partial : 1663
Low Complete : 1625
Range of Results : 139
Range of Mixed : 38

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/13/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR, INC. 20201 Lot No. : NA NA Sample No. : CODE 25.1 (BACK) Heat No. : NA Date Rec'd. : 06/03/11

Size :

Thicknesses :

Avg. Thick. :

Weight : 1.78 lbs. Via : Federal Express Hardness : N/A Returned : Federal Express

Required BL(P). : . Plies/Laminates : 30

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-IIIA 107121; SERIAL#: AL03561072; DOM: 03/23/05; OFFICER: EDDIE CALDWELL; LOT# 1358

SET-UP

Shot Spacing : PER-NIJ-STD-0101.04

Witness Panel :

Obliquity : CLAY 0 deg. 5.5"

Backing Material : CLAY DRY

Conditioning :

Primary Vel. Screens : 6.5 ft., 11.5 ft. Primary Vel. Location : 9.0 ft. From Muzzle Residual NA Residual Vel. Location : NA

Vel. Screens :

Range to Target : 16.4 ft.

Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F

BP : 29.74 in. Hg RH : 50%

Barrel No./Gun : 357/9-R1

Gunner : M.GOMEZ

Recorder : P.PAYNE

AMMUNITION

Projectile : 9mm, FMJ, 124 gr.

Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)

(2) : PRE-TEST CLAY TEMP: 98.5 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3005	1664	3009	1662	1663	P	Y	DEF. 43mm
2		2928	1708	2924	1710	1709	C		
3		3005	1664	3005	1664	1664	P	Y	DEF. 35mm
4		2942	1700	2942	1700	1700	C		
5		3023	1654	3023	1654	1654	C	Y	
6		3126	1599	3126	1599	1599	P	Y	DEF. 36mm
7		3054	1637	3054	1637	1637	C	Y	
8		3140	1592	3144	1590	1591	P	Y	DEF. 39mm
9		3086	1620	3090	1618	1619	P	Y	DEF. 56mm
10		2991	1672	2996	1669	1670	C	Y	
11		3068	1630	3072	1628	1629	C	Y	
12		3171	1577	3171	1577	1577	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1630
High Partial : 1664
Low Complete : 1577
Range of Results : 93
Range of Mixed : 87

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/13/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR, INC. 202014 NA NA

Size :

Thicknesses :

Avg. Thick. :

Required BL(P). : . Plies/Laminates : 30

Sample No. : CODE 25.2 (FRONT)

Heat No. : NA

Weight : 1.74 lbs.

Hardness : N/A

Date Rec'd. : 06/03/11

Via : Federal Express

Returned : Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-IIIA 107121; SERIAL#: AL110585592; DOM: 11/04/05; OFFICER: CHAD LEACH; LOT# 1503

SET-UP

Shot Spacing : PER-NIJ-STD-0101.04

Witness Panel :

Obliquity : CLAY 0 deg. 5.5"

Backing Material : CLAY DRY

Conditioning :

Primary Vel. Screens : 6.5 ft., 11.5 ft. Primary Vel. Location : 9.0 ft. From Muzzle Residual Vel. Screens : NA Residual Vel. Location : NA

Range to Target : 16.4 ft.

Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F

BP : 29.74 in. Hg RH : 50%

Barrel No./Gun : 357/9-R1

Gunner : M.GOMEZ

Recorder : P.PAYNE

AMMUNITION

Projectile : 9mm, FMJ, 124 gr.

Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)

(2) : PRE-TEST CLAY TEMP: 97.9 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3072	1628	3072	1628	1628	P	Y	DEF. 38mm
2		2955	1692	2955	1692	1692	C	Y	
3		3041	1644	3036	1647	1646	C	Y	
4		3149	1588	3149	1588	1588	P	Y	DEF. 37mm
5		3081	1623	3077	1625	1624	C	Y	
6		3203	1561	3203	1561	1561	P	Y	DEF. 38mm
7		3104	1611	3104	1611	1611	C	Y	
8		3198	1563	3198	1563	1563	P	Y	DEF. 35mm
9		3117	1604	3117	1604	1604	P	Y	DEF. 39mm
10		3081	1623	3081	1623	1623	C	Y	
11		3162	1581	3162	1581	1581	C	Y	
12		3239	1544	3239	1544	1544	P	Y	DEF. 38mm

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1605
High Partial : 1628
Low Complete : 1581
Range of Results : 148
Range of Mixed : 47

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/13/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR, INC. 20201 Sample No. : CODE 25.2 (BACK) Heat No. : NA Date Rec'd. : 06/03/11

Size :

Thicknesses :

Avg. Thick. :

Weight : 1.80 lbs. Via : Federal Express Hardness : N/A Returned : Federal Express

Required BL(P). : . Plies/Laminates : 30

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-IIIA 107121; SERIAL#: AL110585592; DOM: 11/04/05; OFFICER: CHAD LEACH; LOT# 1503

SET-UP

Shot Spacing : PER-NIJ-STD-0101.04

Witness Panel :

Obliquity : CLAY 0 deg. 5.5"

Backing Material : CLAY DRY

Conditioning :

Primary Vel. Screens : 6.5 ft., 11.5 ft. Primary Vel. Location : 9.0 ft. From Muzzle Residual NA Residual Vel. Location : NA

Vel. Screens :

Range to Target : 16.4 ft.

Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F

BP : 29.71 in. Hg RH : 53%

Barrel No./Gun : 357/9-R1

Gunner : M.GOMEZ

Recorder : P.PAYNE

AMMUNITION

Projectile : 9mm, FMJ, 124 gr.

Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)

(2) : PRE-TEST CLAY TEMP: 99.1 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3095	1616	3090	1618	1617	P	Y	DEF. 34mm
2		2915	1715	2915	1715	1715	C	Y	
3		2982	1677	2982	1677	1677	P	Y	DEF. 30mm
4		2924	1710	2924	1710	1710	C	Y	
5		2978	1679	2973	1682	1680	C	Y	
6		3108	1609	3108	1609	1609	P	Y	DEF. 35mm
7		3063	1632	3063	1632	1632	C	Y	
8		3162	1581	3162	1581	1581	P		DEF. 35mm
9		3104	1611	3104	1611	1611	P	Y	DEF. 46mm
10		3054	1637	3054	1637	1637	C	Y	
11		3167	1579	3167	1579	1579	P		DEF. 40mm
12		3086	1620	3086	1620	1620	P	Y	DEF. 41mm

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1651
High Partial : 1677
Low Complete : 1632
Range of Results : 106
Range of Mixed : 45

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/13/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR, INC. 221715 NA NA

Size :

Thicknesses :

Avg. Thick. :

Required BL(P). : . Plies/Laminates : 30

Sample No. : CODE 25.3 (FRONT)

Heat No. : NA

Weight : 2.02 lbs.

Hardness : N/A

Date Rec'd. : 06/03/11

Via : Federal Express

Returned : Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-IIIA 107121; SERIAL#: AL03561074; DOM: 03/23/05; OFFICER: ROBERT BURCHETTE; LOT# 1358

SET-UP

Shot Spacing : PER-NIJ-STD-0101.04

Witness Panel :

Obliquity : CLAY 0 deg. 5.5"

Backing Material : CLAY DRY

Conditioning :

Primary Vel. Screens : 6.5 ft., 11.5 ft. Primary Vel. Location : 9.0 ft. From Muzzle Residual Vel. Screens : NA Residual Vel. Location : NA

Range to Target : 16.4 ft.

Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F

BP : 29.71 in. Hg RH : 53%

Barrel No./Gun : 357/9-R1

Gunner : M.GOMEZ

Recorder : P.PAYNE

AMMUNITION

Projectile : 9mm, FMJ, 124 gr.

Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)

(2) : PRE-TEST CLAY TEMP: 98.3 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3023	1654	3023	1654	1654	C	Y	
2		3144	1590	3144	1590	1590	P	Y	DEF. 37mm
3		3099	1613	3099	1613	1613	P	Y	DEF. 38mm
4		3032	1649	3032	1649	1649	C	Y	
5		3126	1599	3126	1599	1599	P	Y	DEF. 36mm
6		3063	1632	3063	1632	1632	C	Y	
7		3149	1588	3153	1586	1587	P		DEF. 38mm
8		3104	1611	3108	1609	1610	C	Y	
9		3188	1568	3189	1568	1568	P		DEF. 44mm
10		3108	1609	3108	1609	1609	P	Y	DEF. 40mm
11		3036	1647	3036	1647	1647	C	Y	
12		3140	1592	3135	1595	1594	P	Y	DEF. 41mm

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1620
High Partial : 1613
Low Complete : 1610
Range of Results : 64
Range of Mixed : 3

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/13/11

TEST PANEL

Manufacturer : SECOND CHANCE BODY ARMOR, INC. 22171 Panel No. : CODE 25.3 (BACK) Heat No. : NA Date Rec'd. : 06/03/11

Size :

Thicknesses :

Avg. Thick. :

Weight : 1.76 lbs. Via : Federal Express Hardness : N/A Returned : Federal Express

Required BL(P). : . Plies/Laminates : 30

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: MON-IIIA 107121; SERIAL#: AL03561074; DOM: 03/23/05; OFFICER: ROBERT BURCHETTE; LOT# 1358

SET-UP

Shot Spacing : PER-NIJ-STD-0101.04

Witness Panel :

Obliquity : CLAY 0 deg. 5.5"

Backing Material : CLAY DRY

Conditioning :

Primary Vel. Screens : 6.5 ft., 11.5 ft. Primary Vel. Location : 9.0 ft. From Muzzle Residual Vel. Screens : NA Residual Vel. Location : NA

Range to Target : 16.4 ft.

Target to Wit. : 0.0 in.

Range No. : 1 Temp. : 70 F

BP : 29.71 in. Hg RH : 53% Barrel No./Gun : 357/9-R1 Gunner : M.GOMEZ Recorder : P.PAYNE

AMMUNITION

Projectile : 9mm, FMJ, 124 gr. Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-0101.04 LEVEL IIIA (MODIFIED)

(2) : PRE-TEST CLAY TEMP: 98.9 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3005	1664	3005	1664	1664	C	Y	
2		3162	1581	3167	1579	1580	P		DEF. 34mm
3		3086	1620	3081	1623	1622	P	Y	DEF. 32mm
4		3014	1659	3018	1657	1658	C	Y	
5		3108	1609	3113	1606	1607	P		DEF. 40mm
6		3077	1625	3077	1625	1625	P	Y	DEF. 36mm
7		3018	1657	3018	1657	1657	P	Y	DEF. 35mm
8		3018	1657	3018	1657	1657	P	Y	DEF. 38mm
9		2915	1715	2919	1713	1714	C	Y	
10		3000	1667	3000	1667	1667	C	Y	
11		3095	1616	3095	1616	1616	P	Y	DEF. 38mm
12		3041	1644	3041	1644	1644	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-30, FLEX WOVEN ARAMID FIBER (26X26).
STITCHING: LAYERS 1-18, 1.25" DIAMOND QUILT STITCH. LAYERS 19-30, 1.25" BOX STITCH. LAYERS 1-30, FOUR VERTICAL STICHES EACH SIDE OF PANEL, 1.25" APART AND TWO AT CENTER OF PANEL, TOP TO BOTTOM.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1652
High Partial : 1657
Low Complete : 1644
Range of Results : 98
Range of Mixed : 13

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 7/1/11

TEST PANEL

ABA 48 NA NA T)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : Hardness : NA 14 NA 2.08
Plies/Laminates : Sample No. : lbs. CODE 26.1

Date Rec'd. : Via : Returned :
06/30/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: SII-6.0; SERIAL#: 06065071; (FRON
DOM: 6/06; LOT# 2360; STYLE: II-160-FS-5276-CL

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : PER-NIJ-STD-2005 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 71 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.78 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 55% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : GOMEZ Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-2005 LEVEL II (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 99.7 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3101	1612	3101	1612	1612	C		
2		3234	1546	3234	1546	1546	P	Y	DEF. 37mm
3		3108	1609	3104	1611	1610	C		
4		3306	1512	3306	1512	1512	C	Y	
5		3293	1518	3297	1517	1517	C	Y	
6		3369	1484	3374	1482	1483	P	Y	DEF. 36mm
7		3293	1518	3293	1518	1518	P	Y	DEF. 32mm
8		3234	1546	3234	1546	1546	C	Y	
9		3288	1521	3293	1518	1520	C	Y	
10		3387	1476	3392	1474	1475	C	Y	
11		3549	1409	3554	1407	1408	P	Y	DEF. 32mm
12		3392	1474	3392	1474	1474	P	Y	DEF. 32mm

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-11, FLEX ARAMID FILM. LAYERS 12-14, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING: LAYERS 1-11, PINWHEEL STITCH. LAYERS 12-14, X STITCH THROUGH CENTER OF PANEL. LAYERS 1-12, TACK AT SHOULDERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1500
High Partial : 1546
Low Complete : 1475
Range of Results : 138
Range of Mixed : 71

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 7/1/11

TEST PANEL

ABA 48 NA NA

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Date Rec'd. : Via : Returned : 03/23/11
Federal Express Federal Express

Heat No. : Weight : Hardness : NA 14 NA 1.98
Plies/Laminates : Sample No. : lbs. CODE 26.1

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: SII-6.0; SERIAL#: 06065071; (BACK)
DOM: 6/06; LOT# 2360; STYLE: II-160-FS-5276-CL

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : PER-NIJ-STD-2005 LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 71 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.78 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 55% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : GOMEZ Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD-2005 LEVEL II (ABBREVIATED)
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3279	1525	3279	1525	1525	P	Y	DEF. 35mm
2		3108	1609	3113	1606	1607	C		
3		3252	1538	3257	1535	1536	C	Y	
4		3378	1480	3387	1476	1478	P	Y	DEF. 32mm
5		3329	1502	3333	1500	1501	C	Y	
6		3509	1425	3513	1423	1424	P		DEF. 32mm
7		3279	1525	3284	1523	1524	C	Y	
8		3410	1466	3414	1465	1465	P	Y	DEF. 36mm
9		3356	1490	3360	1488	1489	P	Y	DEF. 40mm
10		3379	1480	3379	1480	1480	P	Y	DEF. 38mm
11		3207	1559	3207	1559	1559	C	Y	
12		3311	1510	3315	1508	1509	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-11, FLEX ARAMID FILM. LAYERS 12-14, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING: LAYERS 1-11, PINWHEEL STITCH. LAYERS 12-14, X STITCH THROUGH CENTER OF PANEL. LAYERS 1-12, TACK AT TOP CORNERS AND BOTTOM CENTER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1507
High Partial : 1525
Low Complete : 1501
Range of Results : 94
Range of Mixed : 24

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/15/11

TEST PANEL

SAFARILAND LRC NA ONT
NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. : NA 14 NA 1.37
Required BL(P). : Heat No. : Weight : Hardness : lbs. CODE NEW
Plies/Laminates : Sample No. : 1.1 (FR

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: SII-6.0;
SERIAL#: 11191770; DOM: 06/2011; LOT# 025535

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : PER-NIJ-STD- 2005 INTERIM LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.70 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 40% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3401	1470	3401	1470	1470	P		DEF. 34mm
2		3261	1533	3261	1533	1533	C	Y	
3		3423	1461	3428	1459	1460	P		DEF. 35mm
4		3279	1525	3275	1527	1526	C	Y	
5		3383	1478	3383	1478	1478	P	Y	DEF. 36mm
6		3176	1574	3176	1574	1574	C	Y	
7		3383	1478	3383	1478	1478	P	Y	DEF. 37mm
8		3239	1544	3239	1544	1544	P	Y	DEF. 39mm
9		3131	1597	3131	1597	1597	P	Y	DEF. 44mm
10		3162	1581	3158	1583	1582	C	Y	
11		3203	1561	3203	1561	1561	C	Y	
12		3257	1535	3257	1535	1535	P	Y	DEF. 36mm

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-11, FLEX ARAMID FILM. LAYERS 12-14, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING: LAYERS 1-11, PINWHEEL STITCH. LAYERS 12-14, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1541
High Partial : 1597
Low Complete : 1526
Range of Results : 119
Range of Mixed : 71

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/15/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. :
SAFARILAND LRRC NA NA Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 14 NA 1.37
lbs. Sample No. : CODE NEW 1.1 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING
MODEL#: SII-6.0; SERIAL#: 11191773; DOM: 06/2011; LOT# 025535

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL II
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY
DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens :
NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357/9-R2 Gunner :
SHANK BP : RH : 29.70 in. Hg
40%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED) PRE-TEST CLAY TEMP: 98.7 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3509	1425	3509	1425	1425	P		DEF. 34mm
2		3279	1525	3279	1525	1525	P	Y	DEF. 32mm
3		3158	1583	3153	1586	1585	P	Y	DEF. 29mm
4		3059	1635	3059	1635	1635	C		
5		3189	1568	3189	1568	1568	C	Y	
6		3220	1553	3220	1553	1553	C	Y	
7		3392	1474	3392	1474	1474	P	Y	DEF. 36mm
8		3311	1510	3315	1508	1509	C	Y	
9		3230	1548	3230	1548	1548	C	Y	
10		3329	1502	3329	1502	1502	P	Y	DEF. 31mm
11		3234	1546	3234	1546	1546	C	Y	
12		3329	1502	3324	1504	1503	P	Y	DEF. 40mm

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-11, FLEX ARAMID FILM. LAYERS 12-14, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING: LAYERS 1-11, PINWHEEL STITCH. LAYERS 12-14, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1531
High Partial : 1585
Low Complete : 1509
Range of Results : 111
Range of Mixed : 76

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/15/11

TEST PANEL

SAFARILAND LRC NA ONT
NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. : NA 14 NA 1.38
Required BL(P). : lbs. CODE NEW
Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: SII-6.0; Heat No. : Weight : Hardness : 1.2 (PR
SERIAL#: 11191767; DOM: 06/2011; LOT# 025535 Plies/Laminates : Sample No. :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : PER-NIJ-STD- 2005 INTERIM LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.70 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 40% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 100.0 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3338	1498	3338	1498	1498	P	Y	DEF. 31mm
2		3306	1512	3311	1510	1511	P	Y	DEF. 32mm
3		3117	1604	3117	1604	1604	C		
4		3257	1535	3257	1535	1535	C	Y	
5		3374	1482	3378	1480	1481	P	Y	DEF. 29mm
6		3189	1568	3189	1568	1568	C		
7		3333	1500	3338	1498	1499	C	Y	
8		3423	1461	3423	1461	1461	P	Y	DEF. 33mm
9		3284	1523	3284	1523	1523	P	Y	DEF. 46mm
10		3239	1544	3239	1544	1544	C	Y	
11		3302	1514	3306	1512	1513	C	Y	
12		3414	1465	3419	1462	1463	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-11, FLEX ARAMID FILM. LAYERS 12-14, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING:LAYERS 1-14, TACK AT SHOULDERS AND BOTTOM. LAYERS 1-11, PINWHEEL STITCH. LAYERS 12-14, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1503
High Partial : 1523
Low Complete : 1463
Range of Results : 83
Range of Mixed : 60

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/15/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. :
SAFARILAND LRRC NA NA Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 14 NA 1.38
lbs. Sample No. : CODE NEW 1.2 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING
MODEL#: SII-6.0; SERIAL#: 11191772; DOM: 06/2011; LOT# 025535

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL II
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY
DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens :
NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357/9-R2 Gunner :
SHANK BP : RH : 29.70 in. Hg
40%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED) PRE-TEST CLAY TEMP: 99.1 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3430	1458	3433	1456	1457	P		DEF. 34mm
2		3243	1542	3243	1542	1542	P	Y	DEF. 35mm
3		3198	1563	3198	1563	1563	P	Y	DEF. 36mm
4		3145	1590	3145	1590	1590	C	Y	
5		3189	1568	3189	1568	1568	P	Y	DEF. 37mm
6		3072	1628	3072	1628	1628	C		
7		3203	1561	3203	1561	1561	C	Y	
8		3275	1527	3279	1525	1526	P	Y	DEF. 31mm
9		3221	1552	3221	1552	1552	C	Y	
10		3279	1525	3279	1525	1525	C	Y	
11		3365	1486	3365	1486	1486	C	Y	
12		3370	1484	3374	1482	1483	P	Y	DEF. 37mm

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-11, FLEX ARAMID FILM. LAYERS 12-14, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING:LAYERS 1-14, TACK AT SHOULDERS AND BOTTOM. LAYERS 1-11, PINWHEEL STITCH. LAYERS 12-14, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1540
High Partial : 1568
Low Complete : 1486
Range of Results : 107
Range of Mixed : 82

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/15/11

TEST PANEL

SAFARILAND LRC NA ONT
NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

NA 12 NA 1.76
lbs. CODE NEW
Heat No. : Weight : Hardness :
Plies/Laminates : Sample No. : 1.5 (FR

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: SIIIA 6.0;
SERIAL#: 11191776; DOM: 06/2011; LOT# 025597

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : Primary Vel. Location : Temp. :

PER-NIJ-STD- 2005 INTERIM LEVEL IIIA 9.0 ft. From Muzzle 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.70 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 40% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3009	1662	3009	1662	1662	C	Y	
2		3045	1642	3050	1639	1641	P	Y	DEF. 34mm
3		2955	1692	2960	1689	1691	C	Y	
4		3108	1609	3108	1609	1609	P	Y	DEF. 31mm
5		3000	1667	3000	1667	1667	C	Y	
6		3072	1628	3072	1628	1628	P	Y	DEF. 44mm
7		3005	1664	3005	1664	1664	P	Y	DEF. 30mm
8		2978	1679	2978	1679	1679	C	Y	
9		3005	1664	3005	1664	1664	P	Y	DEF. 44mm
10		2906	1721	2906	1721	1721	C	Y	
11		3041	1644	3041	1644	1644	C	Y	
12		3081	1623	3081	1623	1623	P	Y	DEF. 40mm

REMARKS :

MAKE-UP: LAYERS 1-2, 2 PLY FLEX WOVEN FIBER (11X11). LAYERS 3-5 AND 11-12, 2 PLY WOVEN ARAMID FIBER (22x22). LAYERS 6-10, ARAMID FILM.
STITCHING:LAYERS 1-12, TACK AT SHOULDERS AND BOTTOM. LAYERS 1-10, PINWHEEL STITCH. LAYERS 11-12, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1658
High Partial : 1664
Low Complete : 1644
Range of Results : 112
Range of Mixed : 20

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/15/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. :
SAFARILAND LRRC NA NA Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 12 NA 1.76
lbs. Sample No. : CODE NEW 1.3 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING
MODEL#: SIIIA-6.0; SERIAL#: 11191782; DOM: 06/2011; LOT# 025597

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL IIIA
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY
DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens :
NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357/9-R2 Gunner :
SHANK BP : RH : 29.70 in. Hg
40%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED) PRE-TEST CLAY TEMP: 98.5 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3014	1659	3018	1657	1658	C	Y	
2		3198	1563	3198	1563	1563	P	Y	DEF. 36mm
3		3032	1649	3032	1649	1649	C	Y	
4		3113	1606	3113	1606	1606	P	Y	DEF. 33mm
5		3054	1637	3054	1637	1637	P	Y	DEF. 31mm
6		3009	1662	3014	1659	1660	C	Y	
7		3072	1628	3072	1628	1628	P	Y	DEF. 31mm
8		3009	1662	3009	1662	1662	C	Y	
9		3068	1630	3072	1628	1629	C	Y	
10		3099	1613	3099	1613	1613	P	Y	DEF. 30mm
11		3045	1642	3045	1642	1642	C	Y	
12		3126	1599	3126	1599	1599	P	Y	DEF. 39mm

REMARKS :

MAKE-UP: LAYERS 1-2, 2 PLY FLEX WOVEN FIBER (11X11). LAYERS 3-5 AND 11-12, 2 PLY WOVEN ARAMID FIBER (22x22). LAYERS 6-10, ARAMID FILM.
STITCHING:LAYERS 1-12, TACK AT SHOULDERS AND BOTTOM. LAYERS 1-10, PINWHEEL STITCH. LAYERS 11-12, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1629
High Partial : 1637
Low Complete : 1629
Range of Results : 99
Range of Mixed : 8

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/16/11

TEST PANEL

SECOND CHANCE 2015- ONT
2015 NA NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : NA 34 NA 1.92
Plies/Laminates : Sample No. : lbs. CODE NEW
1.4 (FR

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: 329 IIIA R04 6050; SERIAL#: 11191793; DOM: 06/2011; LOT# 025606

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : Primary Vel. Location : Temp. :

PER-NIJ-STD- 2005 INTERIM LEVEL IIIA 9.0 ft. From Muzzle 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.75 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 42% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.7 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2960	1689	2960	1689	1689	P		DEF. 33mm
2		2897	1726	2897	1726	1726	P		DEF. 39mm
3		2784	1796	2789	1793	1794	P		DEF. 41mm
4		2766	1808	2766	1808	1808	P	Y	DEF. 46mm
5		2672	1871	2672	1871	1871	C	Y	
6		2730	1832	2735	1828	1830	C	Y	
7		2753	1816	2753	1816	1816	P	Y	DEF. 37mm
8		2739	1825	2735	1828	1827	C	Y	
9		2798	1787	2789	1793	1790	P		DEF. 52mm
10		2712	1844	2708	1846	1845	C	Y	
11		2739	1825	2735	1828	1827	P	Y	DEF. 51mm
12		2654	1884	2654	1884	1884	P	Y	DEF. 60mm

REMARKS :

MAKE-UP: LAYERS 1-14 AND 15-34, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-34, 1.25" BOXED STITCH. LAYERS 1-34, DOUBLE TACK AT SHOULDERS AND A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1838
High Partial : 1884
Low Complete : 1827
Range of Results : 76
Range of Mixed : 57

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/16/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. : SECOND CHANCE 2015-2015 NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 06/14/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 34 NA 2.06 lbs. Sample No. : CODE NEW 1.4 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: 329-IIIA R04 6050; SERIAL#: 11191794; DOM: 06/2011; LOT# 025606

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL IIIA
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357/9-R2 Gunner :
CHES BP : RH : 29.75 in. Hg 42%

Recorder : SHANK

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED) PRE-TEST CLAY TEMP: 99.7 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3023	1654	3023	1654	1654	P		DEF. 36mm
2		2996	1669	2996	1669	1669	P		DEF. 44mm
3		2883	1734	2883	1734	1734	P		DEF. 39mm
4		2780	1799	2780	1799	1799	C	Y	
5		2874	1740	2879	1737	1738	P		DEF. 40mm
6		2784	1796	2784	1796	1796	P	Y	DEF. 42mm
7		2703	1850	2703	1850	1850	C	Y	
8		2789	1793	2793	1790	1791	C	Y	
9		2780	1799	2775	1802	1800	P	Y	DEF. 42mm
10		2681	1865	2676	1868	1867	C	Y	
11		2784	1796	2784	1796	1796	P	Y	DEF. 44mm
12		2717	1840	2717	1840	1840	P	Y	DEF. 52mm

REMARKS :

MAKE-UP: LAYERS 1-14 AND 15-34, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-34, 1.25" BOXED STITCH. LAYERS 1-34, DOUBLE TACK AT TOP CORNERS AND A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1817
High Partial : 1840
Low Complete : 1791
Range of Results : 76
Range of Mixed : 49

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/16/11

TEST PANEL

SECOND CHANCE 2015- ONT
2015 NA NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : Hardness : NA 34 NA 1.92
Plies/Laminates : Sample No. : 1.5 (FR lbs. CODE NEW

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: 329 IIIA R04 6050; SERIAL#: 11191795; DOM: 06/2011; LOT# 025606

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : Primary Vel. Location : Temp. :

PER-NIJ-STD- 2005 INTERIM LEVEL IIIA 9.0 ft. From Muzzle 69 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.85 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 62% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : CHES Recorder : SHANK

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3027	1652	3023	1654	1653	P		DEF. 34mm
2		2843	1759	2847	1756	1757	P		DEF. 38mm
3		2780	1799	2780	1799	1799	P	Y	DEF. 40mm
4		2708	1846	2708	1846	1846	C	Y	
5		2735	1828	2735	1828	1828	P	Y	DEF. 48mm
6		2726	1834	2730	1832	1833	P	Y	DEF. 46mm
7		2649	1888	2654	1884	1886	C	Y	
8		2703	1850	2699	1853	1851	C	Y	
9		2762	1810	2762	1810	1810	C	Y	
10		2793	1790	2793	1790	1790	P	Y	DEF. 44mm
11		2753	1816	2757	1814	1815	P	Y	DEF. 45mm
12		2667	1875	2667	1875	1875	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-14 AND 15-34, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-34, 1.25" BOXED STITCH. LAYERS 1-34, DOUBLE TACK AT SHOULDERS AND A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1833
High Partial : 1833
Low Complete : 1810
Range of Results : 96
Range of Mixed : 23

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/16/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. : SECOND CHANCE 2015-2015 NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 06/14/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 34 NA 2.05 lbs. Sample No. : CODE NEW 1.5 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: 329-IIIA R04 6050; SERIAL#: 11191796; DOM: 06/2011; LOT# 025606

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL IIIA
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Range No. : 2 Temp. : 69 F
Barrel No./Gun : 357/9-R2 Gunner : SHANK BP : RH : 29.85 in. Hg 62%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED) PRE-TEST CLAY TEMP: 100.0 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2879	1737	2879	1737	1737	P		DEF. 41mm
2		2784	1796	2787	1794	1795	C	Y	
3		2847	1756	2852	1753	1755	P	Y	DEF. 41mm
4		2807	1781	2807	1781	1781	P	Y	DEF. 40mm
5		2748	1820	2753	1816	1818	C	Y	
6		2802	1784	2807	1781	1783	P	Y	DEF. 39mm
7		2748	1820	2748	1820	1820	C	Y	
8		2762	1810	2762	1810	1810	C	Y	
9		2856	1751	2856	1751	1751	P		DEF. 43mm
10		2820	1773	2820	1773	1773	P	Y	DEF. 44mm
11		2775	1802	2775	1802	1802	C	Y	
12		2795	1789	2795	1789	1789	P	Y	DEF. 52mm

REMARKS :

MAKE-UP: LAYERS 1-14 AND 15-34, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-34, 1.25" BOXED STITCH. LAYERS 1-34, DOUBLE TACK AT TOP CORNERS AND A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1793
High Partial : 1789
Low Complete : 1795
Range of Results : 65
Range of Mixed : 0

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/16/11

TEST PANEL

SECOND CHANCE 2015- ONT
2015 NA NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : NA 26 NA 1.48
Plies/Laminates : Sample No. : 1.6 (FR lbs. CODE NEW

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: 329 II R01 6040; SERIAL#: 11191783; DOM: 06/2011; LOT# 025613

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : PER-NIJ-STD- 2005 INTERIM LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 69 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.85 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 62% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.4 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3329	1502	3329	1502	1502	P		DEF. 36mm
2		3180	1572	3180	1572	1572	P		DEF. 44mm
3		3087	1620	3087	1620	1620	P		DEF. 36mm
4		3018	1657	3018	1657	1657	C	Y	
5		3077	1625	3077	1625	1625	P		DEF. 45mm
6		3009	1662	3009	1662	1662	P	Y	DEF. 40mm
7		2919	1713	2919	1713	1713	C	Y	
8		2960	1689	2960	1689	1689	P	Y	DEF. 45mm
9		2910	1718	2915	1715	1717	C	Y	
10		2937	1702	2937	1702	1702	C	Y	
11		2955	1692	2960	1689	1691	P	Y	DEF. 47mm
12		2843	1759	2843	1759	1759	P	Y	DEF. 64mm

REMARKS :

MAKE-UP: LAYERS 1-10 AND 11-26, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-10, 1.25" DIAMOND QUILT STITCH. LAYERS 11-26, 1.25" BOXED STITCH. LAYERS 1-26, DOUBLE TACK AT SHOULDERS A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1699
High Partial : 1759
Low Complete : 1657
Range of Results : 102
Range of Mixed : 102

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/16/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. : SECOND CHANCE 2015-2015 NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 06/14/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 26 NA 1.57 lbs. Sample No. : CODE NEW 1.6 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: 329-II R01 6040; SERIAL#: 11191784; DOM: 06/2011; LOT# 025613

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL II
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Range No. : 2 Temp. : 69 F
Barrel No./Gun : 357/9-R2 Gunner : SHANK BP : RH : 29.85 in. Hg 62%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED) PRE-TEST CLAY TEMP: 98.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2982	1677	2982	1677	1677	P	Y	DEF. 47mm
2		2937	1702	2937	1702	1702	P	Y	DEF. 50mm
3		2829	1767	2825	1770	1769	C		
4		2843	1759	2843	1759	1759	C	Y	
5		2964	1687	2964	1687	1687	C	Y	
6		3027	1652	3027	1652	1652	P	Y	DEF. 46mm
7		2942	1700	2942	1700	1700	P	Y	DEF. 46mm
8		2856	1751	2856	1751	1751	C	Y	
9		3005	1664	3005	1664	1664	P	Y	DEF. 52mm
10		2847	1756	2847	1756	1756	C	Y	
11		3000	1667	3000	1667	1667	C	Y	
12		3081	1623	3081	1623	1623	P		DEF. 56mm

REMARKS :
MAKE-UP: LAYERS 1-10 AND 11-26, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-10, 1.25" DIAMOND QUILT STITCH. LAYERS 11-26, 1.25" BOXED STITCH. LAYERS 1-26, DOUBLE TACK AT TOP CORNERS AND A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :
Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :
No. Points : 5 & 5
V50 : 1702
High Partial : 1702
Low Complete : 1667
Range of Results : 107
Range of Mixed : 35

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/20/11

TEST PANEL

SECOND CHANCE 2015-
2015 NA NA

ONT
)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : Hardness :
Plies/Laminates : Sample No. :

NA 34 NA 1.93
lbs. CODE NEW
1.7 (FR

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: 329 IIIA R04 6050; SERIAL#: 11191789; DOM: 06/2011; LOT# 025606

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : Primary Vel. Location : Temp. :

PER-NIJ-STD- 2005 INTERIM LEVEL IIIA 9.0 ft. From Muzzle 70 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.89 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 60% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.7 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3054	1637	3054	1637	1637	P		DEF. 34mm
2		2919	1713	2919	1713	1713	P		DEF. 47mm
3		2766	1808	2766	1808	1808	P	Y	DEF. 39mm
4		2676	1868	2676	1868	1868	P	Y	DEF. 47mm
5		2589	1931	2586	1933	1932	C	Y	
6		2604	1920	2609	1916	1918	C	Y	
7		2699	1853	2699	1853	1853	P	Y	DEF. 43mm
8		2591	1930	2595	1927	1928	C	Y	
9		2681	1865	2685	1862	1864	C	Y	
10		2735	1828	2735	1828	1828	P	Y	DEF. 56mm
11		2699	1853	2699	1853	1853	P	Y	DEF. 48mm
12		2600	1923	2600	1923	1923	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-14 AND 15-34, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-34, 1.25" BOXED STITCH. LAYERS 1-34, DOUBLE TACK AT SHOULDERS AND A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1878
High Partial : 1868
Low Complete : 1864
Range of Results : 124
Range of Mixed : 4

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/20/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. : SECOND CHANCE 2015-2015 NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 06/14/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 34 NA 2.06 lbs. Sample No. : CODE NEW 1.7 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: 329-IIIA R04 6050; SERIAL#: 11191790; DOM: 06/2011; LOT# 025606

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL IIIA
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Range No. : 2 Temp. : 70 F
Barrel No./Gun : 357/9-R2 Gunner : SHANK BP : RH : 29.89 in. Hg 60%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED) PRE-TEST CLAY TEMP: 98.8 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2793	1790	2793	1790	1790	P	Y	DEF. 40mm
2		2640	1894	2640	1894	1894	C	Y	
3		2730	1832	2735	1828	1830	C	Y	
4		2793	1790	2798	1787	1789	P	Y	DEF. 34mm
5		2694	1856	2694	1856	1856	P	Y	DEF. 38mm
6		2649	1888	2649	1888	1888	C	Y	
7		2735	1828	2739	1825	1827	C	Y	
8		2793	1790	2798	1787	1789	C	Y	
9		2870	1742	2874	1740	1741	P		DEF. 44mm
10		2798	1787	2802	1784	1786	P	Y	DEF. 40mm
11		2681	1865	2681	1865	1865	P	Y	DEF. 44mm
12		2618	1910	2618	1910	1910	C		

REMARKS :

MAKE-UP: LAYERS 1-14 AND 15-34, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-34, 1.25" BOXED STITCH. LAYERS 1-34, DOUBLE TACK AT SHOULDERS AND A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1831
High Partial : 1865
Low Complete : 1789
Range of Results : 108
Range of Mixed : 76

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/20/11

TEST PANEL

SECOND CHANCE 2015-
2015 NA NA

ONT
)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : Hardness :
Plies/Laminates : Sample No. :

NA 34 NA 1.93
lbs. CODE NEW
1.8 (FR

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: 329 IIIA R04 6050; SERIAL#: 11191791; DOM: 06/2011; LOT# 025606

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : Primary Vel. Location : Temp. :

PER-NIJ-STD- 2005 INTERIM LEVEL IIIA 9.0 ft. From Muzzle 70 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.89 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 60% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 100.0 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2807	1781	2807	1781	1781	P		DEF. 38mm
2		2658	1881	2658	1881	1881	P	Y	DEF. 45mm
3		2559	1954	2564	1950	1952	C		
4		2667	1875	2667	1875	1875	P	Y	DEF. 65mm
5		2591	1930	2591	1930	1930	C	Y	
6		2645	1890	2645	1890	1890	P	Y	DEF. 53mm
7		2577	1940	2577	1940	1940	C	Y	
8		2649	1888	2645	1890	1889	C	Y	
9		2694	1856	2699	1853	1854	C	Y	
10		2710	1845	2714	1842	1844	C	Y	
11		2745	1821	2745	1821	1821	P	Y	DEF. 43mm
12		2703	1850	2704	1849	1849	P	Y	DEF. 52mm

REMARKS :

MAKE-UP: LAYERS 1-14 AND 15-34, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-34, 1.25" BOXED STITCH. LAYERS 1-34, DOUBLE TACK AT SHOULDERS AND A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1877
High Partial : 1890
Low Complete : 1844
Range of Results : 119
Range of Mixed : 46

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/20/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. : SECOND CHANCE 2015-2015 NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 06/14/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 34 NA 2.06 lbs. Sample No. : CODE NEW 1.8 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: 329-IIIA R04 6050; SERIAL#: 11191792; DOM: 06/2011; LOT# 025606

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL IIIA
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Range No. : 2 Temp. : 70 F
Barrel No./Gun : 357/9-R2 Gunner : SHANK BP : RH : 29.89 in. Hg 60%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED) PRE-TEST CLAY TEMP: 99.1 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2807	1781	2811	1779	1780	P	Y	DEF. 37mm
2		2654	1884	2654	1884	1884	C	Y	
3		2757	1814	2757	1814	1814	C	Y	
4		2834	1764	2834	1764	1764	P	Y	DEF. 44mm
5		2717	1840	2721	1838	1839	P	Y	DEF. 43mm
6		2681	1865	2681	1865	1865	C	Y	
7		2757	1814	2766	1808	1811	P	Y	DEF. 46mm
8		2685	1862	2685	1862	1862	C	Y	
9		2757	1814	2757	1814	1814	C	Y	
10		2820	1773	2820	1773	1773	P	Y	DEF. 41mm
11		2766	1808	2771	1804	1806	P	Y	DEF. 37mm
12		2699	1853	2703	1850	1851	C	Y	

REMARKS :
MAKE-UP: LAYERS 1-14 AND 15-34, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-14, 1.25" DIAMOND QUILT STITCH. LAYERS 15-34, 1.25" BOXED STITCH. LAYERS 1-34, DOUBLE TACK AT SHOULDERS AND A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :
Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :
No. Points : 6 & 6
V50 : 1822
High Partial : 1839
Low Complete : 1814
Range of Results : 120
Range of Mixed : 25

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/21/11

TEST PANEL

SECOND CHANCE 2015-
2015 NA NA

ONT
)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : Hardness :
Plies/Laminates : Sample No. :

NA 26 NA 1.49
lbs. CODE NEW
2.1 (FR

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: 329 II R01 6040;
SERIAL#: 11191788; DOM: 06/2011; LOT# 025613

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : PER-NIJ-STD- 2005 INTERIM LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.89 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 63% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.8 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3032	1649	3032	1649	1649	P	Y	DEF. 35mm
2		2924	1710	2924	1710	1710	C	Y	
3		3077	1625	3077	1625	1625	P		DEF. 44mm
4		3000	1667	3000	1667	1667	P	Y	DEF. 52mm
5		2942	1700	2942	1700	1700	P	Y	DEF. 46mm
6		2874	1740	2874	1740	1740	C	Y	
7		2910	1718	2906	1721	1719	C	Y	
8		3027	1652	3027	1652	1652	C	Y	
9		3081	1623	3086	1620	1622	P		DEF. 34mm
10		3000	1667	3000	1667	1667	P	Y	DEF. 47mm
11		2942	1700	2942	1700	1700	P	Y	DEF. 58mm
12		2856	1751	2856	1751	1751	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-10 AND 11-26, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-10, 1.25" DIAMOND QUILT STITCH. LAYERS 11-26, 1.25" BOXED STITCH. LAYERS 1-26, DOUBLE TACK AT SHOULDERS A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1696
High Partial : 1700
Low Complete : 1652
Range of Results : 102
Range of Mixed : 48

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/21/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. : SECOND CHANCE 2015-2015 NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 06/14/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 26 NA 1.56 lbs. Sample No. : CODE NEW 2.1 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: 329-II R01 6040; SERIAL#: 11191787; DOM: 06/2011; LOT# 025613

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL II
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357/9-R2 Gunner : SHANK BP : RH : 29.89 in. Hg 63%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED) PRE-TEST CLAY TEMP: 99.1 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3050	1639	3050	1639	1639	P		DEF. 43mm
2		2910	1718	2910	1718	1718	C	Y	
3		3009	1662	3009	1662	1662	P	Y	DEF. 44mm
4		2978	1679	2982	1677	1678	C	Y	
5		2987	1674	2991	1672	1673	P	Y	DEF. 42mm
6		2964	1687	2964	1687	1687	P	Y	DEF. 47mm
7		2883	1734	2888	1731	1733	C	Y	
8		2919	1713	2924	1710	1711	C	Y	
9		3018	1657	3018	1657	1657	P		DEF. 58mm
10		2928	1708	2928	1708	1708	P	Y	DEF. 50mm
11		2879	1737	2883	1734	1736	C	Y	
12		2987	1674	2991	1672	1673	P	Y	DEF. 59mm

REMARKS :

MAKE-UP: LAYERS 1-10 AND 11-26, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-10, 1.25" DIAMOND QUILT STITCH. LAYERS 11-26, 1.25" BOXED STITCH. LAYERS 1-26, DOUBLE TACK AT SHOULDERS A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1698
High Partial : 1708
Low Complete : 1678
Range of Results : 74
Range of Mixed : 30

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/21/11

TEST PANEL

SECOND CHANCE 2015-
2015 NA NA

ONT
)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : Hardness :
Plies/Laminates : Sample No. :

NA 26 NA 1.48
lbs. CODE NEW
2.2 (FR

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: 329 II R01 6040;
SERIAL#: 11191785; DOM: 06/2011; LOT# 025613

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : PER-NIJ-STD- 2005 INTERIM LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.89 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 63% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3032	1649	3036	1647	1648	P	Y	DEF. 39mm
2		2861	1748	2861	1748	1748	C	Y	
3		2964	1687	2969	1684	1685	P	Y	DEF. 40mm
4		2897	1726	2897	1726	1726	C	Y	
5		3000	1667	3005	1664	1665	C	Y	
6		3023	1654	3023	1654	1654	P	Y	DEF. 46mm
7		2960	1689	2960	1689	1689	P	Y	DEF. 43mm
8		2892	1729	2892	1729	1729	C	Y	
9		2946	1697	2946	1697	1697	P	Y	DEF. 52mm
10		2946	1697	2951	1694	1696	C	Y	
11		2996	1669	3000	1667	1668	P	Y	DEF. 40mm
12		2874	1740	2879	1737	1738	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-10 AND 11-26, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-10, 1.25" DIAMOND QUILT STITCH. LAYERS 11-26, 1.25" BOXED STITCH. LAYERS 1-26, DOUBLE TACK AT SHOULDERS A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1695
High Partial : 1697
Low Complete : 1665
Range of Results : 100
Range of Mixed : 32

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/21/11

TEST PANEL

Manufacturer : Size : Thicknesses : Avg. Thick. : SECOND CHANCE 2015-2015 NA NA Required BL(P). :

Date Rec'd. : Via : Returned : 06/14/11 Federal Express Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 26 NA 1.57 lbs. Sample No. : CODE NEW 2.2 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: 329-II R01 6040; SERIAL#: 11191786; DOM: 06/2011; LOT# 025613

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL II

Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens : NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357/9-R2 Gunner : SHANK BP : RH : 29.89 in. Hg 63%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES

(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED) PRE-TEST CLAY TEMP: 99.3 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3063	1632	3063	1632	1632	P		DEF. 45mm
2		2937	1702	2942	1700	1701	P	Y	DEF. 39mm
3		2829	1767	2829	1767	1767	C	Y	
4		2901	1724	2987	1674	1699	C	Y	
5		2964	1687	2964	1687	1687	P	Y	DEF. 53mm
6		2870	1742	2874	1740	1741	P	Y	DEF. 46mm
7		2825	1770	2825	1770	1770	C		
8		2942	1700	2942	1700	1700	P	Y	DEF. 47mm
9		2843	1759	2843	1759	1759	C	Y	
10		2888	1731	2888	1731	1731	P	Y	DEF. 47mm
11		2847	1756	2847	1756	1756	C	Y	
12		2915	1715	2915	1715	1715	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-10 AND 11-26, FLEX WOVEN ARAMID FIBER (24x24).
STITCHING: LAYERS 1-10, 1.25" DIAMOND QUILT STITCH. LAYERS 11-26, 1.25" BOXED STITCH. LAYERS 1-26, DOUBLE TACK AT SHOULDERS A VERTICAL STITCH THROUGH CENTER OF PANEL.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1726
High Partial : 1741
Low Complete : 1699
Range of Results : 80
Range of Mixed : 42

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/21/11

TEST PANEL

SAFARILAND LRC NA ONT
NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : Hardness : NA 14 NA 1.38
Plies/Laminates : Sample No. : lbs. CODE NEW

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: SII-6.0; 2.5 (FR
SERIAL#: 11191768; DOM: 06/2011; LOT# 025535

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : PER-NIJ-STD- 2005 INTERIM LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.89 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 63% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3131	1597	3131	1597	1597	C	Y	
2		3311	1510	3315	1508	1509	P	Y	DEF. 39mm
3		3171	1577	3176	1574	1576	C	Y	
4		3333	1500	3333	1500	1500	P	Y	DEF. 37mm
5		3261	1533	3261	1533	1533	P	Y	DEF. 31mm
6		3126	1599	3131	1597	1598	C	Y	
7		3230	1548	3230	1548	1548	P	Y	DEF. 32mm
8		3135	1595	3135	1595	1595	C	Y	
9		3239	1544	3239	1544	1544	C	Y	
10		3306	1512	3311	1510	1511	P	Y	DEF. 38mm
11		3216	1555	3216	1555	1555	P	Y	DEF. 41mm
12		3144	1590	3149	1588	1589	C	Y	

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-11, FLEX ARAMID FILM. LAYERS 12-14, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING: LAYERS 1-11, PINWHEEL STITCH, TACK AT SHOULDERS AND BOTTOM CENTER. LAYERS 12-14, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 6 & 6
V50 : 1555
High Partial : 1555
Low Complete : 1544
Range of Results : 98
Range of Mixed : 11

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/21/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. :
SAFARILAND LRRC NA NA Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 14 NA 1.38
lbs. Sample No. : CODE NEW 2.3 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: SII-6.0; SERIAL#: 11191774; DOM: 06/2011; LOT# 025535

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL II
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY
DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens :
NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357/9-R2 Gunner :
SHANK BP : RH : 29.89 in. Hg
63%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED) PRE-TEST CLAY TEMP: 99.1 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3171	1577	3171	1577	1577	C	Y	
2		3288	1521	3293	1518	1520	P	Y	DEF. 45mm
3		3239	1544	3234	1546	1545	P	Y	DEF. 32mm
4		3144	1590	3144	1590	1590	P	Y	DEF. 35mm
5		3054	1637	3054	1637	1637	C		
6		3189	1568	3189	1568	1568	C	Y	
7		3248	1539	3252	1538	1538	P	Y	DEF. 44mm
8		3144	1590	3144	1590	1590	C	Y	
9		3203	1561	3203	1561	1561	P	Y	DEF. 46mm
10		3198	1563	3203	1561	1562	C	Y	
11		3203	1561	3203	1561	1561	C	Y	
12		3333	1500	3338	1498	1499	P		DEF. 46mm

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-11, FLEX ARAMID FILM. LAYERS 12-14, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING: LAYERS 1-11, PINWHEEL STITCH, TACK AT TOP CORNERS AND BOTTOM CENTER. LAYERS 12-14, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1561
High Partial : 1590
Low Complete : 1561
Range of Results : 70
Range of Mixed : 29

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/21/11

TEST PANEL

SAFARILAND LRC NA ONT
NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : Hardness : NA 12 NA 1.76
Plies/Laminates : Sample No. : lbs. CODE NEW

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING MODEL#: SIIIA 6.0; 2.4 (FR
SERIAL#: 11191775; DOM: 06/2011; LOT# 025597

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : Primary Vel. Location : Temp. :

PER-NIJ-STD- 2005 INTERIM LEVEL IIIA 9.0 ft. From Muzzle 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.70 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 40% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.3 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3250	1538	3250	1538	1538	P		DEF. 31mm
2		3176	1574	3180	1572	1573	P	Y	DEF. 32mm
3		3014	1659	3014	1659	1659	C	Y	
4		3135	1595	3135	1595	1595	P	Y	DEF. 35mm
5		3063	1632	3063	1632	1632	C	Y	
6		3149	1588	3149	1588	1588	P	Y	DEF. 30mm
7		3000	1667	3000	1667	1667	C	Y	
8		3135	1595	3135	1595	1595	P	Y	DEF. 31mm
9		3095	1616	3095	1616	1616	C	Y	
10		3113	1606	3113	1606	1606	C	Y	
11		3239	1544	3243	1542	1543	P		DEF. 36mm
12		3131	1597	3131	1597	1597	P	Y	DEF. 38mm

REMARKS :

MAKE-UP: LAYERS 1-2, 2 PLY FLEX WOVEN FIBER (11X11). LAYERS 3-5 AND 11-12, 2 PLY WOVEN ARAMID FIBER (22x22). LAYERS 6-10, ARAMID FILM.
STITCHING:LAYERS 1-12, TACK AT SHOULDERS AND BOTTOM. LAYERS 1-10, PINWHEEL STITCH. LAYERS 11-12, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1613
High Partial : 1597
Low Complete : 1606
Range of Results : 94
Range of Mixed : 0

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/22/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. :
SAFARILAND LRRC NA NA Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 12 NA 1.77
lbs. Sample No. : CODE NEW 2.4 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING
MODEL#: SIIIA-6.0; SERIAL#: 11191781; DOM: 06/2011; LOT# 025597

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL IIIA
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY
DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens :
NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357/9-R2 Gunner :
SHANK BP : RH : 29.70 in. Hg
40%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED) PRE-TEST CLAY TEMP: 99.3 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3072	1628	3072	1628	1628	P	Y	DEF. 35mm
2		2996	1669	2996	1669	1669	C	Y	
3		3086	1620	3090	1618	1619	P	Y	DEF. 37mm
4		2964	1687	2969	1684	1685	P	Y	DEF. 40mm
5		2888	1731	2888	1731	1731	C		
6		2982	1677	2982	1677	1677	C	Y	
7		3050	1639	3050	1639	1639	C	Y	
8		3180	1572	3185	1570	1571	P	Y	DEF. 30mm
9		3059	1635	3063	1632	1633	C	Y	
10		3108	1609	3113	1606	1607	C	Y	
11		3225	1550	3225	1550	1550	P		DEF. 32mm
12		3117	1604	3117	1604	1604	P	Y	DEF. 39mm

REMARKS :

MAKE-UP: LAYERS 1-2, 2 PLY FLEX WOVEN FIBER (11X11). LAYERS 3-5 AND 11-12, 2 PLY WOVEN ARAMID FIBER (22x22). LAYERS 6-10, ARAMID FILM.
STITCHING:LAYERS 1-12, TACK AT SHOULDERS AND BOTTOM. LAYERS 1-10, PINWHEEL STITCH. LAYERS 11-12, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1633
High Partial : 1685
Low Complete : 1607
Range of Results : 114
Range of Mixed : 78

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/21/11

TEST PANEL

SAFARILAND LRC NA ONT
NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Heat No. : Weight : Hardness : NA 12 NA 1.76
Plies/Laminates : Sample No. : lbs. CODE NEW

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: SIIIA 6.0; SERIAL#: 11191778; DOM: JUN 2011; LOT#:025597

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : Primary Vel. Location : Temp. : 2.5 (FR

PER-NIJ-STD- 2005 INTERIM LEVEL IIIA 9.0 ft. From Muzzle 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.78 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 69% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357-9mm/R-1 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : M.GOMEZ Recorder : B.SHAFFER

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 98.5 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2865	1745	2865	1745	1745	C		
2		3009	1662	3009	1662	1662	C	Y	
3		3162	1581	3162	1581	1581	P	Y	DEF. 32mm
4		3059	1635	3059	1635	1635	C	Y	
5		3113	1606	3117	1604	1605	C	Y	
6		3207	1559	3207	1559	1559	P	Y	DEF. 37mm
7		3153	1586	3153	1586	1586	C	Y	
8		3234	1546	3230	1548	1547	P		DEF. 35mm
9		3158	1583	3162	1581	1582	P	Y	DEF. 47mm
10		3162	1581	3167	1579	1580	P	Y	DEF. 35mm
11		3158	1583	3158	1583	1583	P	Y	DEF. 32mm
12		3104	1611	3104	1611	1611	C	Y	

REMARKS :

MAKE-UP: LAYERS 1 AND 2, 2 PLY FLEX WOVEN ARAMID FIBER(11x11). LAYERS 3-5, 11, AND 12, 2 PLY FLEX WOVEN ARAMID FIBER(22x22). LAYERS 6-10, FLEX ARAMID FILM.
STITCHING: LAYERS 1-12, DOUBLE TACKED AT SHOULDERS AND BOTTOM. LAYERS 1-10, PINWHEEL STITCH. LAYERS 11-12, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1598
High Partial : 1583
Low Complete : 1586
Range of Results : 103
Range of Mixed : 0

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/21/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. :
SAFARILAND LRRC NA NA Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 12 NA 1.77
lbs. Sample No. : CODE NEW 2.5 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: SIIIA-6.0; SERIAL#: 11191780; DOM: JUN 2011; LOT#: 025597

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL IIIA
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY
DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens :
NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357-9mm/R-1
Gunner : M.GOMEZ BP : RH :
29.78 in. Hg 69%

Recorder : B.SHAFFER

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED) PRE-TEST CLAY TEMP: 97.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		2856	1751	2861	1748	1749	C		
2		3018	1657	3018	1657	1657	C	Y	
3		3140	1592	3144	1590	1591	C	Y	
4		3297	1517	3297	1517	1517	P		DEF. 30mm
5		3162	1581	3158	1583	1582	P	Y	DEF. 33mm
6		3126	1599	3126	1599	1599	P	Y	DEF. 32mm
7		3054	1637	3054	1637	1637	C	Y	
8		3090	1618	3095	1616	1617	C	Y	
9		3077	1625	3081	1623	1624	P	Y	DEF. 39mm
10		3140	1592	3140	1592	1592	C	Y	
11		3131	1597	3135	1595	1596	P	Y	DEF. 32mm
12		3113	1606	3113	1606	1606	P	Y	DEF. 45mm

REMARKS :

MAKE-UP: LAYERS 1-2, 2 PLY FLEX WOVEN FIBER (11X11). LAYERS 3-5 AND 11-12, 2 PLY WOVEN ARAMID FIBER (22x22). LAYERS 6-10, ARAMID FILM.
STITCHING:LAYERS 1-12, TACK AT SHOULDERS AND BOTTOM. LAYERS 1-10, PINWHEEL STITCH. LAYERS 11-12, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1610
High Partial : 1624
Low Complete : 1591
Range of Results : 75
Range of Mixed : 33

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/22/11

TEST PANEL

SAFARILAND LRC NA ONT
NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

NA 14 NA 1.38
lbs. CODE NEW

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: SII-6.0;
SERIAL#: 11191769; DOM: 06/2011; LOT# 025535

Heat No. : Weight : Hardness :
Plies/Laminates : Sample No. : 2.8 (FR

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : PER-NIJ-STD- 2005 INTERIM LEVEL II Primary Vel. Location : 9.0 ft. From Muzzle Temp. : 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.80 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 65% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357/9-R2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.0 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3230	1548	3230	1548	1548	C	Y	
2		3330	1502	3332	1501	1501	C	Y	
3		3502	1428	3502	1428	1428	P		DEF. 33mm
4		3387	1476	3387	1476	1476	P	Y	DEF. 43mm
5		3194	1565	3194	1565	1565	C		
6		3342	1496	3347	1494	1495	C	Y	
7		3367	1485	3369	1484	1485	P	Y	DEF. 37mm
8		3378	1480	3383	1478	1479	P	Y	DEF. 43mm
9		3257	1535	3261	1533	1534	P	Y	DEF. 46mm
10		3198	1563	3194	1565	1564	C	Y	
11		3239	1544	3243	1542	1543	C	Y	
12		3360	1488	3360	1488	1488	P	Y	DEF. 41mm

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-11, FLEX ARAMID FILM. LAYERS 12-14, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING: LAYERS 1-11, PINWHEEL STITCH, TACK AT SHOULDERS AND BOTTOM CENTER. LAYERS 12-14, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1511
High Partial : 1534
Low Complete : 1495
Range of Results : 88
Range of Mixed : 39

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/22/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. :
SAFARILAND LRC NA NA Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 14 NA 1.37
lbs. Sample No. : CODE NEW 2.6 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: SII-6.0; SERIAL#: 11191771; DOM: 06/2011; LOT# 025535

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL II
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY
DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens :
NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357/9-R2 Gunner :
SHANK BP : RH : 29.80 in. Hg
65%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL II (MODIFIED) PRE-TEST CLAY TEMP: 98.4 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3468	1442	3468	1442	1442	P	Y	DEF. 34mm
2		3225	1550	3225	1550	1550	P	Y	DEF. 34mm
3		3086	1620	3086	1620	1620	C		
4		3208	1559	3208	1559	1559	C	Y	
5		3369	1484	3369	1484	1484	P	Y	DEF. 34mm
6		3243	1542	3243	1542	1542	C	Y	
7		3347	1494	3351	1492	1493	C	Y	
8		3427	1459	3427	1459	1459	C	Y	
9		3529	1417	3529	1417	1417	P		DEF. 36mm
10		3450	1449	3450	1449	1449	P	Y	DEF. 33mm
11		3207	1559	3207	1559	1559	C	Y	
12		3351	1492	3351	1492	1492	P	Y	DEF. 52mm

REMARKS :

MAKE-UP: LAYERS 1-6, FLEX WOVEN ARAMID FIBER (28X28). LAYERS 7-11, FLEX ARAMID FILM. LAYERS 12-14, 2 PLY FLEX WOVEN ARAMID FIBER (24X24).
STITCHING: LAYERS 1-11, PINWHEEL STITCH, TACK AT SHOULDERS AND BOTTOM CENTER. LAYERS 12-14, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1503
High Partial : 1550
Low Complete : 1459
Range of Results : 117
Range of Mixed : 91

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/22/11

TEST PANEL

SAFARILAND LRC NA ONT
NA)

Manufacturer :
Size :
Thicknesses :
Avg. Thick. :
Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : NA 12 NA 1.75 lbs. CODE NEW
Plies/Laminates : Sample No. : 2.7 (FR

Description : SEE REMARKS FOR MAKEUP AND STITCHING. MODEL#: SIIIA 6.0;
SERIAL#: 11191777; DOM: JUN 2011; LOT#:025597

SET-UP Primary Vel. Screens : 6.5 ft., 11.5 ft. Range No. : 2 Shot Spacing : Primary Vel. Location : Temp. :

PER-NIJ-STD- 2005 INTERIM LEVEL IIIA 9.0 ft. From Muzzle 68 F Witness Panel : CLAY Residual Vel. Screens : NA BP : 29.78 in. Hg Obliquity : 0 deg. Residual Vel. Location : NA RH : 69% Backing Material : 5.5" CLAY Range to Target : 16.4 ft. Barrel No./Gun : 357-9mm/R-2 Conditioning : DRY Target to Wit. : 0.0 in. Gunner : SHANK Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr. Lot No. : REMINGTON 23558 Powder : ACCURATE NO. 2 APPLICABLE STANDARDS OR PROCEDURES

(1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED)
(2) : PRE-TEST CLAY TEMP: 99.6 F
(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3202	1562	3206	1560	1561	P		DEF. 33mm
2		3104	1611	3105	1610	1611	P	Y	DEF. 36mm
3		3045	1642	3045	1642	1642	C	Y	
4		3162	1581	3162	1581	1581	C	Y	
5		3306	1512	3306	1512	1512	P		DEF. 31mm
6		3216	1555	3216	1555	1555	P		DEF. 35mm
7		3090	1618	3090	1618	1618	P	Y	DEF. 31mm
8		2982	1677	2982	1677	1677	C	Y	
9		3081	1623	3081	1623	1623	P	Y	DEF. 45mm
10		3018	1657	3018	1657	1657	C	Y	
11		3113	1606	3113	1606	1606	P		DEF. 33mm
12		3063	1632	3063	1632	1632	P	Y	DEF. 48mm

REMARKS :

MAKE-UP: LAYERS 1-2, 2 PLY FLEX WOVEN ARAMID FIBER (11X11). LAYERS 3-5 AND 11-12, 2 PLY FLEX WOVEN ARAMID FIBER (22x22). LAYERS 6-10, FLEX ARAMID FILM.
STITCHING:LAYERS 1-12, TACK AT SHOULDERS AND BOTTOM. LAYERS 1-10, PINWHEEL STITCH. LAYERS 11-12, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 4 & 4
V50 : 1630
High Partial : 1632
Low Complete : 1581
Range of Results : 96
Range of Mixed : 51

H.P. White Laboratory, Inc. POLICE EXEC RESEARCH FORUM

PROTECTION BALLISTIC LIMIT TEST, V50 BL(P) Job No. : 11768-01 Test Date : 6/22/11

TEST PANEL
Manufacturer : Size : Thicknesses : Avg. Thick. :
SAFARILAND LRC NA NA Required BL(P). :

Date Rec'd. : Via : Returned :
06/14/11 Federal Express
Federal Express

Heat No. : Weight : Hardness : Plies/Laminates : NA 12 NA 1.76
lbs. Sample No. : CODE NEW 2.7 (BACK)

Description : SEE REMARKS FOR MAKEUP AND STITCHING.
MODEL#: SIIIA-6.0; SERIAL#: 11191779; DOM: JUN 2011; LOT#:025597

SET-UP Primary Vel. Location :Shot Spacing : 9.0 ft. From MuzzlePER-NIJ-STD- 2005 INTERIM LEVEL IIIA
Primary Vel. Screens : 6.5 ft., 11.5 ft.
Obliquity : Witness Panel : Backing Material :
Conditioning : 0 deg. CLAY 5.5" CLAY
DRY

Range to Target : Target to Wit. : 16.4 ft. 0.0 in. Residual Vel. Screens :
NA Residual Vel. Location : NA

Range No. : 2 Temp. : 68 F
Barrel No./Gun : 357-9mm/R-2
Gunner : SHANK BP : RH : 29.78
in. Hg 69%

Recorder : ADAMS

AMMUNITION Projectile : 9mm, FMJ, 124 gr.
Powder : ACCURATE NO. 2

Lot No. : REMINGTON 23558

APPLICABLE STANDARDS OR PROCEDURES
(2) : (1) : PER-NIJ-STD- 2005 INTERIM LEVEL IIIA (MODIFIED) PRE-TEST CLAY TEMP: 98.8 F

(3) :

Shot No.	Powder/ Seating	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Result	Include in V50	Footnotes
1		3104	1611	3108	1609	1610	P	Y	DEF. 37mm
2		2951	1694	2951	1694	1694	C		
3		2978	1679	2978	1679	1679	C		
4		3063	1632	3068	1630	1631	C	Y	
5		3140	1592	3144	1590	1591	P	Y	DEF. 30mm
6		3068	1630	3068	1630	1630	C	Y	
7		3189	1568	3189	1568	1568	P	Y	DEF. 29mm
8		3023	1654	3023	1654	1654	C	Y	
9		3198	1563	3203	1561	1562	P	Y	DEF. 38mm
10		3045	1642	3050	1639	1641	C	Y	
11		3135	1595	3140	1592	1594	C	Y	
12		3198	1563	3203	1561	1562	P	Y	DEF. 40mm

REMARKS :

MAKE-UP: LAYERS 1-2, 2 PLY FLEX WOVEN ARAMID FIBER (11X11). LAYERS 3-5 AND 11-12, 2 PLY FLEX WOVEN ARAMID FIBER (22x22). LAYERS 6-10, FLEX ARAMID FILM.
STITCHING:LAYERS 1-12, TACK AT TOP CORNERS AND BOTTOM. LAYERS 1-10, PINWHEEL STITCH. LAYERS 11-12, X STITCH THROUGH CENTER OF PANEL.
NO CARRIER.

FOOTNOTES :

Result Codes:
P (Partial) - did not penetrate
C (Complete) - penetrated
D (Disregard) - shot not included in calculations
BH (Bad Hit) - shot not included in calculations

V50 SUMMARY :

No. Points : 5 & 5
V50 : 1604
High Partial : 1610
Low Complete : 1594
Range of Results : 92
Range of Mixed : 16

APPENDIX G

Fiber Testing Results

Table G-1 Specific strain energy, wave speed and the ballistic performance parameter (BPP) for fiber from new vests.

Specific Strain Energy $\sigma\varepsilon/2\rho$, J/kg x 10^3	**Wave Speed $\left(\frac{E}{\rho}\right)^{0.5}$, m/s X 10^3**	$[V]^{\frac{1}{3}}\ \{m/s\}$ **BPP**
42.4	7.96	697
47.4	8.12	727
41.8	7.93	692
55.6	8.74	785
44.4	8.80	731
54.7	8.90	786
51.7	8.44	758
48.1	8.61	745
45.2	8.05	714
46.1	9.03	746
50.8	8.28	749
58.9	7.91	775
48.6	8.09	732
34.9	8.08	655
41.8	8.25	701
51.2 ± 8.23	**8.54 ± 0.331**	**756 ± 46**

Table G-2 Specific strain energy, wave speed and the ballistic performance parameter (BPP) for fiber from 5 year old vests

Specific Strain Energy $\sigma\varepsilon/2\rho$, J/kg x 10^3	**Wave Speed $\left(\frac{E}{\rho}\right)^{0.5}$, m/s X 10^3**	$[V]^{\frac{1}{3}}\{m/s\}$
44.0	9.05	736
61.6	9.24	828
49.6	8.54	750
52.3	8.81	772
61.8	8.85	817
57.6	8.5	787
47.4	8.21	729
52.3	8.16	752
52.0	8.23	753
36.2	8.80	683
44.6	8.40	721
56.0	8.58	782
44.3	8.07	709
53.0	8.58	769
52.2	8.62	766
37.7	8.47	682
44.1	8.28	714
42.6	8.18	698
43.2	8.31	711
54.7	8.88	780
54.2	8.32	767
51.3	8.33	753
50.4	8.18	743
62.5	8.82	858
62.9	8.60	815
63.0	8.43	809
59.6	8.48	796
47.5 ± 6.22	**8.35 ± 0.375**	**733 ± 37**

Table G-3. Tensile Modulus, Tensile Strength and Strain to Failure of Fiber in the Vest

Density (Kg/mm^3)	Tensile Strength (GPa)	Tensile Modulus (GPa)	Strain to Failure
1440	3.54	91	.0346
1440	3.74	95	.0365
1440	3.48	91	.0346
1440	4.48	110	.0357
1440	3.77	112	.0339
1440	4.53	114	.0348
1440	4.21	103	.0354
1440	4.05	107	.0342
1440	3.76	93	.0346
1440	3.97	117	.0334
1440	3.92	99	.0373
1440	4.00	90	.0434
1440	3.84	94	.0365
1440	3.27	94	.0308
1440	3.46	98	.0348

Table G-4. Tensile Modulus, Tensile Strength and Strain to Failure of Fiber in the vest.

Density (Kg/mm^3)	Tensile Strength (GPa)	Tensile Modulus (GPa)	Strain to Failure
1440	3.79	118	.0335
1440	5.03	123	.0353
1440	4.15	105	.0344
1440	4.23	112	.0356
1440	4.72	113	.0377
1440	4.28	104	.0387
1440	3.77	97	.0362
1440	3.93	96	.0383
1440	3.95	97	.0379
1440	3.59	112	.0291
1440	3.88	102	.0331
1440	4.27	106	.0377
1440	3.54	94	.0360
1440	4.16	106	.0368
1440	4.27	107	.0352
1440	3.49	103	.0311
1440	3.65	99	.0348
1440	3.63	96	.0330
1440	3.76	99	.0331
1440	4.42	114	.0350
1440	4.11	100	.038
1440	3.99	100	.0370
1440	3.93	96	.0369
1440	4.28	127	.0454
1440	4.10	107	.0442
1440	4.12	102	.0440
1440	3.92	104	.0438
1440	3.70	107	.0308

Table G-5 Fiber Diameter Measurements

Sample Name	Fabric Direction	Diameter in µm 1	2	3	4	5	Mean	Std. Dev.	CV	Small Sample Correction
PERF-NEW-1.1-H	1	13.2	12.7	10.0	12.4	11.8	12.0	1.2	10.30%	10.81%
	2	11.5	11.7	11.1	12.0	11.9	11.6	0.4	3.07%	3.23%
	Overall:						**11.8**	**0.9**		
PERF-NEW-1.2-H	1	11.1	11.5	11.5	10.4	10.7	11.0	0.5	4.42%	4.64%
	2	11.9	12.1	12.0	11.6	11.2	11.8	0.4	3.10%	3.26%
	Overall:						**11.4**	**0.6**		
PERF-NEW-1.3-H	1	12.3	11.7	11.7	12.1	10.9	11.7	0.5	4.57%	4.80%
	2	11.6	12.8	11.0	11.5	12.0	11.8	0.7	5.71%	5.99%
	Overall:						**11.8**	**0.6**		
PERF-NEW-1.4-W	1	7.8	9.0	8.1	8.3	8.6	8.4	0.5	5.52%	5.80%
	2	9.7	8.7	8.7	7.2	8.5	8.6	0.9	10.44%	10.96%
	Overall:						**8.5**	**0.7**		
PERF-NEW-1.5-W	1	8.1	9.0	8.1	8.8	9.1	8.6	0.5	5.65%	5.93%
	2	8.6	8.6	9.0	8.3	7.6	8.4	0.5	6.19%	6.50%
	Overall:						**8.5**	**0.5**		
PERF-NEW-1.6-W	1	8.6	8.0	8.0	8.4	8.8	8.4	0.4	4.28%	4.49%
	2	8.3	8.0	7.8	8.1	9.0	8.2	0.5	5.60%	5.88%
	Overall:						**8.3**	**0.4**		
PERF-NEW-1.7-W	1	8.4	8.3	8.6	9.0	9.7	8.8	0.6	6.48%	6.80%
	2	8.1	9.0	8.7	8.7	8.3	8.6	0.4	4.18%	4.39%
	Overall:						**8.7**	**0.5**		
PERF-NEW-1.8-W	1	8.7	7.9	9.1	8.1	9.5	8.7	0.7	7.73%	8.12%
	2	8.5	7.8	9.2	8.6	8.3	8.5	0.5	5.98%	6.28%
	Overall:						**8.6**	**0.6**		

PERF-NEW-2.1-W	1	10.4	9.5	8.7	9.2	9.0	9.4	0.7	6.95%	7.30%
	2	8.8	8.3	9.1	8.6	8.5	8.7	0.3	3.52%	3.70%
	Overall:						**9.0**	**0.6**		
PERF-NEW-2.2-W	1	7.7	7.9	8.0	7.8	8.5	8.0	0.3	3.90%	4.10%
	2	8.5	8.7	8.5	8.6	8.3	8.5	0.1	1.74%	1.83%
	Overall:						**8.3**	**0.4**		
PERF-NEW-2.3-H	1	10.8	11.1	11.5	11.8	11.6	11.4	0.4	3.55%	3.73%
	2	11.3	10.8	10.8	11.9	11.7	11.3	0.5	4.47%	4.69%
	Overall:						**11.3**	**0.4**		
PERF-NEW-2.4-H	1	11.5	12.0	11.9	11.6	11.5	11.7	0.2	2.00%	2.10%
	2	11.6	12.0	10.2	11.2	10.1	11.0	0.8	7.66%	8.04%
	Overall:						**11.4**	**0.7**		
PERF-NEW-2.5-H	1	11.7	12.3	11.6	12.4	11.5	11.9	0.4	3.52%	3.69%
	2	10.8	10.9	11.3	12.0	10.5	11.1	0.6	5.21%	5.48%
	Overall:						**11.5**	**0.6**		
PERF-NEW-2.6-H	1	11.3	11.9	11.2	11.7	12.2	11.7	0.4	3.57%	3.75%
	2	11.2	11.5	11.5	10.1	11.1	11.1	0.6	5.20%	5.46%
	Overall:						**11.4**	**0.6**		
PERF-NEW-2.7-H	1	11.7	11.5	11.4	11.0	10.8	11.3	0.4	3.28%	3.45%
	2	11.5	10.1	12.1	11.3	11.6	11.3	0.7	6.56%	6.89%
	Overall:						**11.3**	**0.6**		
PERF-USED-1.1-H	1	11.7	10.5	12.4	12.4	13.1	12.0	1.0	8.18%	8.59%
	2	11.0	10.5	11.1	11.6	11.7	11.2	0.5	4.35%	4.57%
	Overall:						**11.6**	**0.9**		
PERF-USED-1.2-W	1	6.5	8.1	7.3	7.2	7.4	7.3	0.6	7.81%	8.20%
	2	7.7	8.1	7.4	7.4	7.3	7.6	0.3	4.32%	4.53%
	Overall:						**7.4**	**0.5**		

PERF-USED-2.1-W	1	8.3	7.1	8.7	8.4	7.4	8.0	0.7	8.65%	9.09%
	2	9.0	7.9	7.7	7.9	8.1	8.1	0.5	6.30%	6.62%
	Overall:						**8.1**	**0.6**		
PERF-USED-4.1-H	1	10.4	10.8	11.0	10.4	10.6	10.6	0.3	2.45%	2.57%
	2	11.9	11.4	11.1	11.5	12.0	11.6	0.4	3.20%	3.36%
	Overall:						**11.1**	**0.6**		
PERF-USED-5.1-H	1	10.2	11.1	11.1	10.2	11.8	10.9	0.7	6.28%	6.60%
	2	11.5	11.3	11.0	10.8	10.4	11.0	0.4	3.91%	4.11%
	Overall:						**10.9**	**0.5**		
PERF-USED-6.1-H	1	11.5	11.2	10.3	10.5	10.5	10.8	0.5	4.81%	5.05%
	2	11.0	11.9	13.1	11.9	10.6	11.7	1.0	8.26%	8.68%
	Overall:						**11.3**	**0.9**		
PERF-USED-7.1-H	1	11.0	12.2	11.1	11.7	11.5	11.5	0.5	4.22%	4.43%
	2	11.5	12.2	12.7	12.6	12.7	12.3	0.5	4.16%	4.36%
	Overall:						**11.9**	**0.6**		
PERF-USED-8.1-H	1	11.6	11.7	11.7	13.4	12.4	12.2	0.8	6.28%	6.59%
	2	12.6	11.9	13.5	12.8	12.4	12.6	0.6	4.63%	4.87%
	Overall:						**12.4**	**0.7**		
PERF-USED-9.1-H	1	12.4	12.0	12.0	12.2	11.7	12.1	0.3	2.16%	2.27%
	2	12.1	12.5	11.1	12.5	13.0	12.2	0.7	5.82%	6.11%
	Overall:						**12.2**	**0.5**		
PERF-USED-10.1-W	1	7.7	6.8	7.4	8.0	7.9	7.6	0.5	6.38%	6.70%
	2	8.4	8.1	8.0	9.0	8.5	8.4	0.4	4.69%	4.92%
	Overall:						**8.0**	**0.6**		
PERF-USED-11.1-W	1	7.8	8.5	8.4	7.4	8.1	8.0	0.5	5.60%	5.88%
	2	7.9	8.3	9.0	9.1	7.9	8.4	0.6	6.89%	7.23%
	Overall:						**8.2**	**0.5**		

PERF-USED-12.1	1	8.3	8.5	8.6	9.5	8.9	8.8	0.5	5.33%	5.60%
	2	8.1	7.9	8.5	8.0	9.4	8.4	0.6	7.33%	7.69%
	Overall:						**8.6**	**0.6**		
PERF-USED-13.1-H	1	13.0	10.6	12.8	12.1	11.8	12.1	1.0	7.90%	8.30%
	2	11.9	11.5	11.6	11.2	11.5	11.5	0.3	2.18%	2.28%
	Overall:						**11.8**	**0.7**		
PERF-USED-14.1-H	1	13.0	12.5	13.0	12.9	11.1	12.5	0.8	6.47%	6.80%
	2	11.5	12.6	12.9	12.6	11.5	12.2	0.7	5.47%	5.74%
	Overall:						**12.4**	**0.7**		
PERF-USED-15.1-H	1	11.3	11.8	11.9	10.8	11.2	11.4	0.5	3.97%	4.17%
	2	12.0	12.5	12.6	11.2	11.9	12.0	0.6	4.65%	4.88%
	Overall:						**11.7**	**0.6**		
PERF-USED-16.1-W	1	8.0	8.3	9.1	8.4	7.6	8.3	0.6	6.69%	7.03%
	2	7.9	8.3	8.1	8.0	8.1	8.1	0.1	1.84%	1.93%
	Overall:						**8.2**	**0.4**		
PERF-USED-17.1-W	1	9.3	8.6	8.0	9.1	8.7	8.7	0.5	5.76%	6.04%
	2	7.9	8.6	8.3	7.3	7.7	8.0	0.5	6.38%	6.70%
	Overall:						**8.4**	**0.6**		
PERF-USED-18.1-H	1	12.9	11.2	12.0	11.9	12.6	12.1	0.7	5.45%	5.73%
	2	11.0	11.9	13.5	12.9	11.3	12.1	1.1	8.74%	9.18%
	Overall:						**12.1**	**0.8**		
PERF-USED-19.1-W	1	8.1	7.7	8.6	9.0	8.5	8.4	0.5	5.93%	6.23%
	2	8.0	8.5	8.0	7.9	7.9	8.1	0.3	3.11%	3.27%
	Overall:						**8.2**	**0.4**		
PERF-USED-19.2-W	1	7.7	8.5	7.9	8.7	8.5	8.3	0.4	5.25%	5.51%
	2	8.8	8.0	7.9	8.3	8.1	8.2	0.4	4.34%	4.55%
	Overall:						**8.2**	**0.4**		

PERF-USED-19.3-W	1	8.3	8.8	7.4	8.3	8.4	8.2	0.5	6.22%	6.53%
	2	7.8	8.5	7.9	7.6	8.1	8.0	0.3	4.29%	4.50%
	Overall:						**8.1**	**0.4**		
PERF-USED-20.1-H	1	9.0	9.0	8.3	8.7	8.5	8.7	0.3	3.54%	3.72%
	2	9.1	9.4	8.6	9.2	7.7	8.8	0.7	7.75%	8.14%
	Overall:						**8.8**	**0.5**		
PERF-USED-21.1-W	1	8.6	8.8	8.0	7.5	8.4	8.3	0.5	6.27%	6.58%
	2	7.0	8.3	7.9	7.7	8.5	7.9	0.6	7.42%	7.79%
	Overall:						**8.1**	**0.6**		
PERF-USED-22.1-H	1	12.0	13.1	12.8	11.1	11.1	12.0	0.9	7.75%	8.13%
	2	11.2	12.3	11.3	11.2	11.8	11.6	0.5	4.18%	4.38%
	Overall:						**11.8**	**0.7**		
PERF-USED-23.1-H	1	12.2	11.5	10.6	10.6	12.6	11.5	0.9	7.92%	8.32%
	2	10.8	12.0	11.2	11.5	11.8	11.5	0.5	4.17%	4.37%
	Overall:						**11.5**	**0.7**		
PERF-USED-24.1-W	1	8.8	8.5	8.3	8.3	8.1	8.4	0.3	3.15%	3.31%
	2	7.7	9.1	7.9	8.8	7.5	8.2	0.7	8.62%	9.05%
	Overall:						**8.3**	**0.5**		
PERF-USED-25.1-W	1	7.1	8.3	7.6	8.6	8.7	8.1	0.7	8.53%	8.96%
	2	7.9	8.7	8.5	8.5	7.3	8.2	0.6	7.04%	7.40%
	Overall:						**8.1**	**0.6**		
PERF-USED-25.2-W	1	9.1	9.4	8.7	7.7	7.8	8.5	0.8	8.94%	9.39%
	2	8.7	9.0	8.3	8.3	7.9	8.4	0.4	5.00%	5.25%
	Overall:						**8.5**	**0.6**		
PERF-USED-25.3-W	1	8.3	9.1	8.1	8.1	9.0	8.5	0.5	5.77%	6.06%
	2	7.6	8.6	8.0	7.5	7.8	7.9	0.4	5.52%	5.79%
	Overall:						**8.2**	**0.5**		

PERF-USED-26.1-H	1	11.0	11.6	12.2	10.9	11.7	11.5	0.5	4.67%		4.90%
	2	11.9	12.4	12.9	11.7	10.5	11.9	0.9	7.59%		7.96%
	Overall:						**11.7**	**0.7**			
									MAX	10.44%	10.96%
									MEAN	5.50%	5.77%
									N	90	90
									N VALUES LE 5%	39	37
									N VALUES 5% - 10%	49	51
									N VALUES GE 10%	2	2

NOTES:

-45 fabric samples supplied by Sponsor and received 8/15/11. Samples identified in results below.

-Yarns were unraveled from fabric to extract individual fibers for measurement.

-For diameter measurements, 5 fiber samples in each fabric direction were randomly selected for measurement.

-Equipment used: Motic microscope with digital imaging.

Table G-6 Detailed Tensile Results for New Vests

Sample:	PERF-New-1.1-H		
Mean Diameter (µm):	11.8		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4358	91.92	4.08
2	3833	94.71	3.72
3	3192	88.03	3.12
4	4122	94.64	4.06
5	2725	84.79	2.89
6	3945	95.93	3.61
7	2494	94.36	2.42
8	2968	92.15	2.92
9	3831	94.49	3.57
10	3974	80.84	4.18
Mean:	**3544**	**91.19**	**3.46**
Std. Dev:	**644**	**5.02**	**0.59**
% CV	**18.2**	**5.51**	**17.19**

Sample:	PERF-New-1.2-H		
Mean Diameter (µm):	11.4		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3446	92.30	3.49
2	3759	98.91	3.48
3	3951	92.86	3.87
4	3488	92.13	3.49
5	3681	91.97	3.79
6	4487	98.47	4.38
7	3571	101.28	3.27
8	3664	93.87	3.59
9	3564	89.80	3.6
10	3817	98.71	3.52
Mean:	**3743**	**95.03**	**3.65**
Std. Dev:	**303**	**3.92**	**0.31**
% CV	**8.1**	**4.12**	**8.42**

Sample:	PERF-New-1.3-H		
Mean Diameter (µm):	11.8		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3388	93.00	3.29
2	3411	92.73	3.17
3	2867	87.63	3.21
4	3547	92.43	3.48
5	3731	93.89	3.60
6	3303	78.74	3.60
7	3209	86.51	3.21
8	4227	99.48	3.86
9	3326	90.00	3.30
10	3967	92.23	3.88
Mean:	**3498**	**90.66**	**3.46**
Std. Dev:	**391**	**5.50**	**0.27**
% CV	**11.2**	**6.07**	**7.70**

Sample:	PERF-New-1.4-W		
Mean Diameter (µm):	8.5		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4499	114.28	3.40
2	4288	91.07	3.80
3	5185	131.36	3.69
4	3707	114.50	2.82
5	4712	110.92	3.68
6	4160	102.64	3.47
7	5032	106.50	4.10
8	4498	118.75	3.48
9	4380	110.76	3.58
10	4355	101.12	3.70
Mean:	**4482**	**110.19**	**3.57**
Std. Dev:	**424**	**10.93**	**0.33**
% CV	**9.5**	**9.92**	**9.27**

Sample:	PERF-New-1.5-W		
Mean Diameter (µm):	8.5		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4059	111.17	3.79
2	4376	91.23	4.30
3	4393	137.00	3.30
4	4032	140.70	3.11
5	2950	123.78	2.63
6	3576	82.39	3.59
7	4198	109.63	3.78
8	3202	85.19	3.30
9	3173	122.28	2.71
10	3784	112.20	3.38
Mean:	**3774**	**111.56**	**3.39**
Std. Dev:	**525**	**20.34**	**0.51**
% CV	**13.9**	**18.24**	**14.96**

Sample:	PERF-New-1.6-W		
Mean Diameter (µm):	8.3		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4921	109.25	3.59
2	4047	141.01	2.99
3	5232	115.77	3.98
4	4819	123.76	3.40
5	4432	112.79	3.47
6	5012	110.42	3.78
7	4318	111.47	3.40
8	3475	84.53	3.29
9	4018	106.76	3.09
10	5026	125.96	3.78
Mean:	**4530**	**114.17**	**3.48**
Std. Dev:	**565**	**14.66**	**0.31**
% CV	**12.5**	**12.84**	**9.01**

Sample:	PERF-New-1.7-W		
Mean Diameter (µm):	8.7		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4524	106.28	3.70
2	4575	121.27	3.59
3	3572	89.73	3.27
4	4384	99.28	3.80
5	4438	99.43	3.98
6	3338	106.37	2.60
7	4062	94.91	3.47
8	4346	114.32	3.47
9	4381	106.36	3.68
10	4470	88.85	3.84
Mean:	**4209**	**102.68**	**3.54**
Std. Dev:	**424**	**10.34**	**0.39**
% CV	**10.1**	**10.07**	**11.00**

Sample:	PERF-New-1.8-W		
Mean Diameter (µm):	8.6		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4269	114.74	3.50
2	4192	105.67	3.59
3	4748	108.38	3.87
4	4355	108.39	3.59
5	3978	106.27	3.39
6	3870	108.18	3.20
7	3550	109.41	2.81
8	4476	100.29	3.99
9	3469	100.48	2.90
10	3609	106.91	3.31
Mean:	**4052**	**106.87**	**3.42**
Std. Dev:	**428**	**4.22**	**0.38**
% CV	**10.6**	**3.95**	**11.11**

Sample:	PERF-New-2.1-W		
Mean Diameter (µm):	9.0		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3763	106.17	3.32
2	3967	81.08	3.97
3	3970	96.96	3.68
4	4113	97.95	3.58
5	3634	76.42	3.66
6	4132	98.37	3.57
7	3134	83.82	3.16
8	3468	96.25	3.16
9	4261	98.04	3.59
10	3190	99.18	2.90
Mean:	**3763**	**93.42**	**3.46**
Std. Dev:	**397**	**9.52**	**0.32**
% CV	**10.6**	**10.19**	**9.17**

Sample:	PERF-New-2.2-W		
Mean Diameter (µm):	8.3		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3975	103.32	3.51
2	4925	156.48	3.51
3	4519	90.57	4.19
4	4506	110.86	3.72
5	3535	114.32	3.50
6	3445	119.17	2.92
7	4426	136.35	3.20
8	3777	106.31	3.21
9	3275	136.66	2.71
10	3354	100.34	2.90
Mean:	**3974**	**117.44**	**3.34**
Std. Dev:	**584**	**20.12**	**0.44**
% CV	**14.7**	**17.14**	**13.23**

Sample:	PERF-New-2.3-H		
Mean Diameter (µm):	11.3		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	2561	95.30	2.38
2	4668	88.73	4.54
3	2953	96.76	2.89
4	3810	91.29	3.78
5	3618	108.17	3.09
6	4418	106.38	4.80
7	4872	113.42	3.87
8	3822	90.31	3.59
9	4907	108.73	4.09
10	3582	88.80	4.27
Mean:	**3921**	**98.79**	**3.73**
Std. Dev:	**796**	**9.45**	**0.76**
% CV	**20.3**	**9.57**	**20.38**

Sample:	PERF-New-2.4-H		
Mean Diameter (µm):	11.4		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3677	73.85	4.42
2	4224	92.00	4.18
3	4351	101.46	4.01
4	4404	93.10	4.27
5	4323	59.81	5.92
6	3660	78.64	4.30
7	4227	111.57	4.09
8	4381	92.28	4.27
9	3501	107.21	3.52
10	3246	91.46	3.40
Mean:	**3999**	**90.14**	**4.24**
Std. Dev:	**431**	**15.69**	**0.68**
% CV	**10.8**	**17.40**	**16.05**

Sample:	PERF-New-2.5-H		
Mean Diameter (µm):	11.5		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3316	84.95	4.10
2	3748	91.03	3.59
3	3703	84.18	3.78
4	3780	95.71	3.39
5	4311	95.10	3.79
6	4398	104.70	3.88
7	3537	112.65	3.00
8	4296	97.25	3.87
9	4339	99.89	3.98
10	2922	77.60	3.09
Mean:	**3835**	**94.31**	**3.65**
Std. Dev:	**498**	**10.36**	**0.37**
% CV	**13.0**	**10.99**	**10.24**

Sample:	PERF-New-2.6-H		
Mean Diameter (µm):	11.4		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3047	102.78	2.73
2	3934	102.02	3.39
3	3111	90.51	3.00
4	2870	104.63	2.51
5	4013	96.73	3.62
6	3144	81.94	3.28
7	3370	99.99	3.10
8	2409	72.22	2.78
9	4427	96.20	4.06
10	2320	93.03	2.32
Mean:	**3265**	**94.01**	**3.08**
Std. Dev:	**686**	**10.20**	**0.53**
% CV	**21.0**	**10.85**	**17.15**

Sample:	PERF-New-2.7-H		
Mean Diameter (µm):	11.3		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3527	104.54	3.32
2	3831	102.26	3.68
3	3342	101.13	3.30
4	2498	100.32	2.42
5	4358	92.56	4.30
6	3441	96.88	3.39
7	3129	94.43	3.18
8	3033	78.68	3.87
9	4549	96.31	4.48
10	2886	113.10	2.81
Mean:	**3459**	**98.02**	**3.48**
Std. Dev:	**641**	**8.97**	**0.63**
% CV	**18.5**	**9.15**	**18.18**

NOTES:

-45 fabric samples supplied by Sponsor and received 8/15/11. Samples identified in results below.

-Yarns were unraveled from fabric to extract individual fibers for measurement.

-For tensile measurements, 5 fiber samples in each fabric direction were randomly selected for measurement.

-In the results below, Replicates 1 through 5 correspond to Direction 1 in Fiber Diameter measurements, and Replicates 6 through 10 correspond to Direction 2. (All ten values were averaged.)

-Equipment used: MTS Q-Test/5

-Test Speed: 15 mm/min; Gauge Length: 1 inch

-Test Method: ASTM D3822

Table G-7 Detailed Tensile Results for Used Vests

Sample:	PERF-Used-1.1-H		
Mean Diameter (µm):	11.6		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3903	116.69	3.51
2	4002	117.44	3.59
3	4005	117.45	3.50
4	3803	120.40	3.30
5	4132	125.93	3.41
6	2771	118.09	2.42
7	3951	125.63	3.31
8	3805	112.59	3.59
9	4374	115.90	3.92
10	3194	112.01	2.93
Mean:	**3794**	**118.21**	**3.35**
Std. Dev:	**469**	**4.69**	**0.41**
% CV	**12.4**	**3.97**	**12.34**

Sample:	PERF-Used-1.2-W		
Mean Diameter (µm):	7.4		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	5619	131.93	3.80
2	4819	124.83	3.38
3	3439	122.43	2.31
4	4486	109.15	3.47
5	5580	131.84	3.79
6	5260	137.86	3.55
7	5107	118.33	3.66
8	5087	114.99	3.67
9	5499	121.59	3.75
10	5395	116.97	3.87
Mean:	**5029**	**122.99**	**3.53**
Std. Dev:	**661**	**8.81**	**0.45**
% CV	**13.2**	**7.16**	**12.88**

Sample:	PERF-Used-2.1-W		
Mean Diameter (µm):	8.1		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3626	108.62	2.72
2	4032	90.34	3.78
3	4461	124.09	3.20
4	3914	108.75	3.13
5	4538	102.72	3.78
6	4597	114.23	3.50
7	4344	99.29	3.88
8	3603	98.76	3.09
9	4064	109.24	3.50
10	4318	94.02	3.78
Mean:	**4150**	**105.01**	**3.44**
Std. Dev:	**360**	**10.04**	**0.39**
% CV	**8.7**	**9.56**	**11.24**

Sample:	PERF-Used-4.1-H		
Mean Diameter (µm):	11.1		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3544	106.25	3.20
2	3792	109.87	3.20
3	4086	107.66	3.89
4	3644	110.82	3.08
5	2730	113.85	2.41
6	4897	121.33	3.71
7	5176	112.11	4.27
8	5200	124.33	3.87
9	4368	99.22	3.98
10	4851	112.59	3.98
Mean:	**4229**	**111.80**	**3.56**
Std. Dev:	**814**	**7.18**	**0.57**
% CV	**19.2**	**6.42**	**15.94**

Sample:	PERF-Used-5.1-H		
Mean Diameter (µm):	10.9		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4732	115.06	3.66
2	4931	116.67	3.79
3	5209	113.98	4.08
4	4049	106.30	3.39
5	4920	120.51	3.71
6	4735	105.29	4.07
7	5235	115.82	3.98
8	4077	98.26	3.78
9	4720	114.88	3.69
10	4631	120.37	3.50
Mean:	**4724**	**112.71**	**3.77**
Std. Dev:	**403**	**7.16**	**0.23**
% CV	**8.5**	**6.35**	**6.07**

Sample:	PERF-Used-6.1-H		
Mean Diameter (µm):	11.3		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3881	104.31	3.39
2	3558	104.43	3.19
3	4388	98.73	4.21
4	4108	88.67	4.07
5	4041	105.16	3.58
6	4556	111.28	3.88
7	4530	102.68	4.09
8	4720	111.65	4.48
9	4255	100.05	3.80
10	4795	114.21	4.00
Mean:	**4283**	**104.12**	**3.87**
Std. Dev:	**391**	**7.43**	**0.39**
% CV	**9.1**	**7.14**	**10.10**

Sample:	PERF-Used-7.1-H		
Mean Diameter (µm):	11.9		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3819	102.78	3.59
2	3353	88.01	3.39
3	3139	88.30	3.19
4	3379	92.14	3.35
5	3586	92.16	3.58
6	4281	108.77	3.66
7	3641	100.61	3.47
8	4164	98.75	3.88
9	4713	100.08	4.47
10	3633	98.37	3.60
Mean:	**3771**	**97.00**	**3.62**
Std. Dev:	**483**	**6.69**	**0.35**
% CV	**12.8**	**6.90**	**9.78**

Sample:	PERF-Used-8.1-H		
Mean Diameter (µm):	12.4		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3511	95.06	3.44
2	3538	95.89	3.56
3	3627	96.03	3.48
4	3961	91.20	4.00
5	3941	85.32	4.14
6	4388	104.06	3.96
7	3919	99.27	3.82
8	4055	94.30	3.98
9	4152	99.39	3.89
10	4193	97.26	4.05
Mean:	**3929**	**95.78**	**3.83**
Std. Dev:	**292**	**5.05**	**0.25**
% CV	**7.4**	**5.27**	**6.53**

Sample:	PERF-Used-9.1-H		
Mean Diameter (µm):	12.2		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4267	96.09	4.15
2	4196	97.17	3.95
3	3944	97.32	3.70
4	3953	93.73	3.85
5	3062	100.65	2.90
6	4246	100.22	3.98
7	3470	101.29	3.28
8	3710	90.98	3.89
9	4433	100.61	4.05
10	4236	96.35	4.16
Mean:	**3952**	**97.44**	**3.79**
Std. Dev:	**427**	**3.36**	**0.40**
% CV	**10.8**	**3.45**	**10.66**

Sample:	PERF-Used-10.1-W		
Mean Diameter (µm):	8.0		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	2855	109.93	2.22
2	2945	99.25	2.73
3	2790	94.42	2.60
4	3104	124.35	2.34
5	3381	118.45	2.61
6	3601	92.60	3.38
7	3916	124.75	2.98
8	4397	118.03	3.38
9	4576	115.60	3.50
10	4289	117.84	3.38
Mean:	**3585**	**111.52**	**2.91**
Std. Dev:	**674**	**11.97**	**0.48**
% CV	**18.8**	**10.74**	**16.33**

Sample:	PERF-Used-11.1-W		
Mean Diameter (µm):	8.2		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4482	96.48	3.90
2	3356	93.74	2.96
3	3633	112.02	2.99
4	3263	99.79	2.70
5	4053	91.66	3.67
6	3857	92.93	3.57
7	4210	105.78	3.50
8	3416	88.69	3.00
9	4110	114.73	3.35
10	4495	119.75	3.45
Mean:	**3888**	**101.56**	**3.31**
Std. Dev:	**455**	**10.85**	**0.38**
% CV	**11.7**	**10.68**	**11.47**

Sample:	PERF-Used-12.1		
Mean Diameter (µm):	8.6		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3293	97.17	2.79
2	2774	92.00	2.69
3	3451	99.13	2.96
4	3064	103.15	2.60
5	3144	95.91	2.94
6	2758	106.92	2.32
7	2558	77.19	2.70
8	2593	111.61	2.00
9	3137	92.20	2.85
10	2615	95.75	2.56
Mean:	**2939**	**97.10**	**2.64**
Std. Dev:	**319**	**9.41**	**0.30**
% CV	**10.8**	**9.69**	**11.18**

Sample:	PERF-Used-13.1-H		
Mean Diameter (µm):	11.8		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4132	94.40	3.98
2	4261	104.16	3.97
3	4847	119.24	3.79
4	3710	110.05	3.17
5	5074	118.24	3.98
6	3765	102.99	3.46
7	4301	105.52	3.76
8	4388	100.60	4.13
9	4163	99.69	3.87
10	4064	105.41	3.59
Mean:	**4271**	**106.03**	**3.77**
Std. Dev:	**426**	**7.87**	**0.29**
% CV	**10.0**	**7.43**	**7.69**

Sample:	PERF-Used-14.1-H		
Mean Diameter (µm):	12.4		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4041	97.59	3.90
2	3720	97.26	3.59
3	2995	97.19	3.70
4	3567	88.90	3.67
5	3756	90.00	3.98
6	3403	93.13	3.31
7	3768	101.11	3.45
8	3208	86.04	3.38
9	3820	92.19	3.86
10	3154	94.66	3.15
Mean:	**3543**	**93.81**	**3.60**
Std. Dev:	**339**	**4.64**	**0.27**
% CV	**9.6**	**4.95**	**7.61**

Sample:	PERF-Used-15.1-H		
Mean Diameter (µm):	11.7		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3823	93.87	3.78
2	4525	99.21	4.26
3	4551	102.68	4.14
4	4446	108.77	3.79
5	4213	106.96	3.77
6	4157	113.15	3.46
7	3412	112.06	2.8
8	3998	105.42	3.5
9	4217	109.86	3.7
10	4235	107.38	3.59
Mean:	**4158**	**105.94**	**3.68**
Std. Dev:	**346**	**5.94**	**0.40**
% CV	**8.3**	**5.61**	**10.88**

Sample:	PERF-Used-16.1-W		
Mean Diameter (µm):	8.2		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3944	111.55	3.17
2	4222	95.98	3.79
3	3392	102.24	3.18
4	4903	113.05	3.85
5	4377	107.65	3.49
6	4572	101.46	3.75
7	4126	98.45	3.47
8	4042	93.47	3.59
9	4877	119.95	3.74
10	4264	127.29	3.19
Mean:	**4272**	**107.11**	**3.52**
Std. Dev:	**450**	**10.89**	**0.27**
% CV	**10.5**	**10.17**	**7.56**

Sample:	PERF-Used-17.1-W		
Mean Diameter (µm):	8.4		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3919	107.39	3.19
2	2459	112.47	2.20
3	3432	116.38	2.80
4	4196	101.29	3.57
5	3939	102.49	3.30
6	3230	106.76	2.79
7	2695	79.21	2.97
8	3903	105.69	3.37
9	3731	106.08	3.17
10	3384	94.51	3.77
Mean:	**3489**	**103.23**	**3.11**
Std. Dev:	**567**	**10.33**	**0.45**
% CV	**16.2**	**10.00**	**14.39**

Sample:	PERF-Used-18.1-H		
Mean Diameter (µm):	12.1		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3522	94.96	3.49
2	4260	96.02	4.10
3	4099	107.14	3.51
4	3350	96.77	3.19
5	3282	89.06	3.39
6	3571	97.40	3.50
7	3813	92.70	3.78
8	3670	107.41	3.29
9	3893	109.86	3.59
10	3052	96.13	2.91
Mean:	**3651**	**98.75**	**3.48**
Std. Dev:	**375**	**6.94**	**0.32**
% CV	**10.3**	**7.03**	**9.30**

Sample:	PERF-Used-19.1-W		
Mean Diameter (µm):	8.2		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	2956	81.85	2.97
2	2618	80.23	2.80
3	2663	66.11	3.23
4	3848	96.57	3.47
5	3345	88.42	3.36
6	3693	116.26	2.80
7	4444	107.71	3.87
8	4715	109.03	3.89
9	3682	101.63	3.07
10	4332	114.83	3.57
Mean:	**3630**	**96.26**	**3.30**
Std. Dev:	**736**	**16.68**	**0.40**
% CV	**20.3**	**17.32**	**12.13**

Sample:	PERF-Used-19.2-W		
Mean Diameter (µm):	8.2		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4281	109.05	3.66
2	3875	96.38	3.45
3	3037	87.41	3.07
4	4386	103.48	3.87
5	2682	84.99	2.67
6	3108	86.40	2.87
7	4437	107.61	3.65
8	3531	97.94	2.97
9	4117	112.00	3.47
10	4114	108.41	3.43
Mean:	**3757**	**99.37**	**3.31**
Std. Dev:	**628**	**10.27**	**0.39**
% CV	**16.7**	**10.33**	**11.86**

Sample:	PERF-Used-19.3-W		
Mean Diameter (µm):	8.1		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4133	111.67	3.50
2	3913	102.64	3.38
3	3873	100.07	3.38
4	4234	109.45	3.36
5	4573	117.54	3.66
6	3077	113.49	2.55
7	3275	102.76	2.70
8	3693	114.14	2.97
9	3158	94.67	2.77
10	3063	101.88	2.49
Mean:	**3699**	**106.83**	**3.08**
Std. Dev:	**535**	**7.42**	**0.43**
% CV	**14.5**	**6.94**	**13.93**

Sample:	PERF-Used-20.1-H		
Mean Diameter (µm):	8.8		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	2710	92.10	2.71
2	2937	94.50	2.60
3	2848	102.97	2.51
4	2197	84.86	2.12
5	2348	88.18	2.27
6	2381	96.07	2.28
7	2699	108.47	2.30
8	3656	78.07	3.73
9	2830	89.48	2.59
10	3724	98.50	3.43
Mean:	**2833**	**93.32**	**2.65**
Std. Dev:	**512**	**8.85**	**0.53**
% CV	**18.1**	**9.49**	**19.81**

Sample:	PERF-Used-21.1-W		
Mean Diameter (µm):	8.1		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4333	110.08	3.28
2	4973	120.71	3.86
3	4486	121.44	3.58
4	3768	115.03	2.87
5	4603	113.73	3.54
6	4734	120.81	3.58
7	4131	97.68	3.64
8	4199	95.63	3.78
9	4686	115.96	3.68
10	4233	124.08	3.18
Mean:	**4415**	**113.52**	**3.50**
Std. Dev:	**352**	**9.83**	**0.30**
% CV	**8.0**	**8.66**	**8.64**

Sample:	PERF-Used-22.1-H		
Mean Diameter (µm):	11.8		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3287	86.49	3.39
2	3931	101.20	3.75
3	4715	106.55	4.05
4	4334	111.35	3.67
5	3104	96.30	2.97
6	3951	104.54	3.47
7	4602	106.50	4.06
8	4705	95.62	4.42
9	3999	93.93	3.85
10	4473	95.35	4.33
Mean:	**4110**	**99.78**	**3.80**
Std. Dev:	**568**	**7.52**	**0.45**
% CV	**13.8**	**7.54**	**11.73**

Sample:	PERF-Used-23.1-H		
Mean Diameter (µm):	11.5		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4083	101.70	3.74
2	3642	99.15	3.42
3	3635	100.30	3.36
4	4388	93.39	4.32
5	3714	100.93	3.44
6	4025	97.29	3.75
7	4197	101.46	3.78
8	4252	101.39	4.08
9	4080	104.27	3.65
10	3894	99.99	3.56
Mean:	**3991**	**99.99**	**3.71**
Std. Dev:	**263**	**2.94**	**0.30**
% CV	**6.6**	**2.94**	**8.15**

Sample:	PERF-Used-24.1-W		
Mean Diameter (µm):	8.3		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4101	91.82	3.77
2	3944	107.24	3.42
3	3856	99.43	3.62
4	3973	92.68	3.71
5	4611	108.49	3.77
6	3862	96.51	3.66
7	2945	84.39	3.27
8	3981	91.45	3.49
9	4144	87.23	4.69
10	3892	103.29	3.47
Mean:	**3931**	**96.25**	**3.69**
Std. Dev:	**412**	**8.22**	**0.39**
% CV	**10.5**	**8.54**	**10.53**

Sample:	PERF-Used-25.1-W		
Mean Diameter (µm):	8.1		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3732	109.88	4.28
2	4694	105.08	5.60
3	3385	121.10	4.00
4	4291	113.25	5.20
5	3883	143.18	3.80
6	4162	158.58	4.30
7	4992	132.05	4.89
8	4902	140.20	4.68
9	4829	140.90	4.60
10	3949	106.59	4.00
Mean:	**4282**	**127.08**	**4.54**
Std. Dev:	**553**	**18.46**	**0.57**
% CV	**12.9**	**14.52**	**12.65**

Sample:	PERF-Used-25.2-W		
Mean Diameter (µm):	8.5		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3340	105.64	3.60
2	3662	105.17	3.91
3	4188	81.39	4.69
4	3272	84.82	4.20
5	4158	116.88	4.39
6	4572	111.96	4.49
7	4244	121.52	4.10
8	4749	108.64	4.89
9	4147	117.75	4.97
10	4708	112.04	4.97
Mean:	**4104**	**106.58**	**4.42**
Std. Dev:	**527**	**13.45**	**0.47**
% CV	**12.8**	**12.62**	**10.63**

Sample:	PERF-Used-25.3-W		
Mean Diameter (µm):	8.2		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	4074	89.06	4.80
2	4054	94.32	4.50
3	4749	110.78	4.40
4	4680	103.50	4.59
5	3771	94.07	4.69
6	4363	105.70	4.40
7	4088	107.39	3.80
8	3765	95.46	4.20
9	4413	107.37	5.01
10	3264	116.33	3.60
Mean:	**4122**	**102.40**	**4.40**
Std. Dev:	**452**	**8.74**	**0.43**
% CV	**11.0**	**8.53**	**9.89**

Sample:	PERF-Used-26.1-H		
Mean Diameter (µm):	11.7		
n	Tensile Strength (MPa)	Modulus (GPa)	Strain at Failure (%)
1	3176	108.63	4.20
2	3019	96.78	4.00
3	4243	95.03	4.96
4	3815	105.18	4.11
5	4536	103.54	4.89
6	4259	104.13	4.68
7	4137	109.66	4.20
8	3608	105.98	4.30
9	4086	102.84	4.40
10	4319	104.46	4.08
Mean:	**3920**	**103.62**	**4.38**
Std. Dev:	**506**	**4.62**	**0.34**
% CV	**12.9**	**4.45**	**7.85**

NOTES:

-45 fabric samples supplied by Sponsor and received 8/15/11. Samples identified in results below.

-Yarns were unraveled from fabric to extract individual fibers for measurement.

-For tensile measurements, 5 fiber samples in each fabric direction were randomly selected for measurement.

-In the results below, Replicates 1 through 5 correspond to Direction 1 in Fiber Diameter measurements, and Replicates 6 through 10 correspond to Direction 2. (All ten values were averaged.)

-Equipment used: MTS Q-Test/5

-Test Speed: 15 mm/min; Gauge Length: 1 inch

-Test Method: ASTM D3822