



The Soldier: America's Most Deployed Combat System



**Project Manager Soldier Equipment Briefing
on the
May 2006 Evaluation of
Pinnacle Armor SOV 3000 "Dragon Skin"**



Executive Summary

Background



- **Project Manager, Soldier Equipment (PM SEQ) conducted testing of Pinnacle Armor's SOV 3000™ Body Armor Vest (Dragon Skin) from 16 -19 May at H. P. White labs near APG. (HP White is the National Institute of Justice certified ballistics lab used to test Army Body Armor)**
- **Since the inception of the IBA program in 1999, Pinnacle Armor has never responded to a full and open competition.**
- **Test was conducted using Enhanced Small Arms Protective Inserts (ESAPI) and Enhanced Side Ballistic Inserts (ESBI) First Article Test protocols.**
- **Prior to fielding, ALL ESAPI designs must pass a robust FAT protocol under a variety of environmental conditions including high (+160° F) and low (-60° F) temperature, diesel fuel, oil, and saltwater immersion, and a 14 hour temperature cycle from -25° F to +120° F.**



Executive Summary

Background (continued)



- **Pinnacle SOV 3000 level IV Dragon Skin suffered catastrophic failure of the ceramic disc containment grid adhesive at -60° F, 120° F and 160° F.**
 - SOV 3000 design is sensitive to extreme temperatures and failed to maintain ballistic integrity at temperatures below summer ambient in OIF.
 - This failure mode caused discs to delaminate and accumulate in the lower portion of the armor panel, thus resulting in exposing the spine, vital organs, and critical blood vessels to lesser ballistic threats.
- **Pinnacle SOV 3000 level IV Dragon Skin vests suffered 13 first or second shot complete penetrations, failing 4 of 8 initial subtests with ESAPI threat baseline 7.62 x 63mm APM2 Armor Piercing (AP) ammunition.**

Bottom Line up Front:
Dragon skin does not meet required protection standards



Pinnacle Test Sequence



Step 1: Configuration Analysis

- **Receipt of vests**
 - Establish initial accountability, storage, and security
- **Conduct Configuration Analysis:**
 - Label
 - Weight
 - Dimension
 - X-Ray
 - Photograph

Step 2: Ballistic Testing

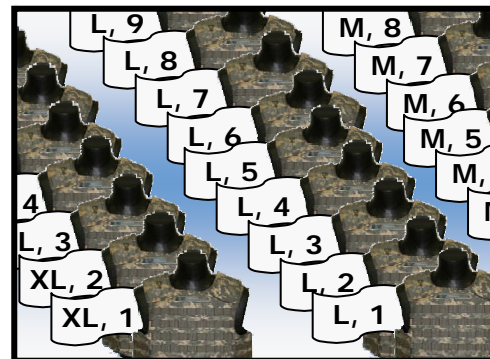
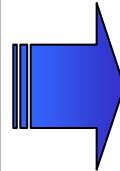
- **Prescribed series of live-fire tests**
- **Vests tested under varied conditions:**
 - Weather extremes
 - Conditioned with oil / fuel
- **After durability / drop test**
- **Record results**



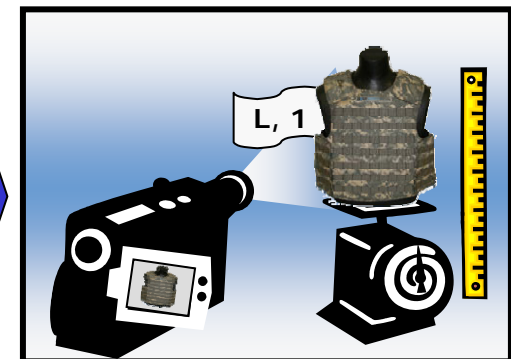
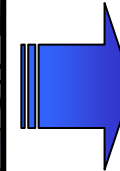
Configuration Analysis



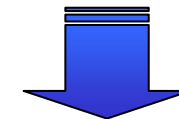
Receive delivery of 30
"Dragon Skin" vests.



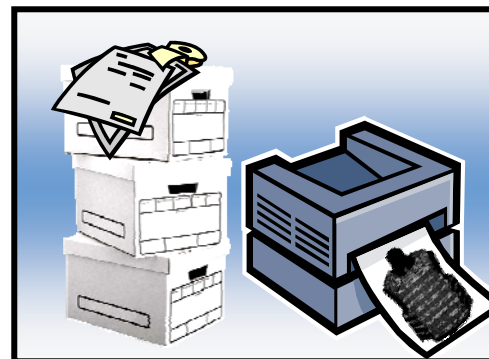
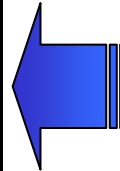
Identify, tally and label vest:
XL1 - XL10, L1 - L10, M1 - M10



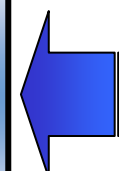
Measure, weigh and
photograph vests on scale.



Send vest to storage/appropriate
conditioning area.



Analyze, correlate and print all list,
measurements, photos and x-rays.



X-ray vests.



Key Findings



- **Physical Characteristics**
 - Weight
 - Area of Coverage
 - Thickness
 - Ballistic Protection Coverage
- **Ballistic Performance**



Weight / Coverage

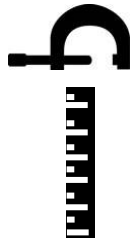


Interceptor Body Armor

Size: L



Weight: 28 lbs



Thickness: ≤ 1.3 in

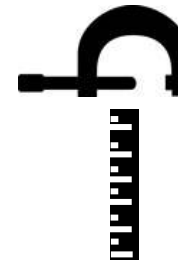
Coverage: 720 in²

Pinnacle SOV 3000

Size: XL*



Weight: 47.5 lbs



Thickness: 1.7in - 1.9 in

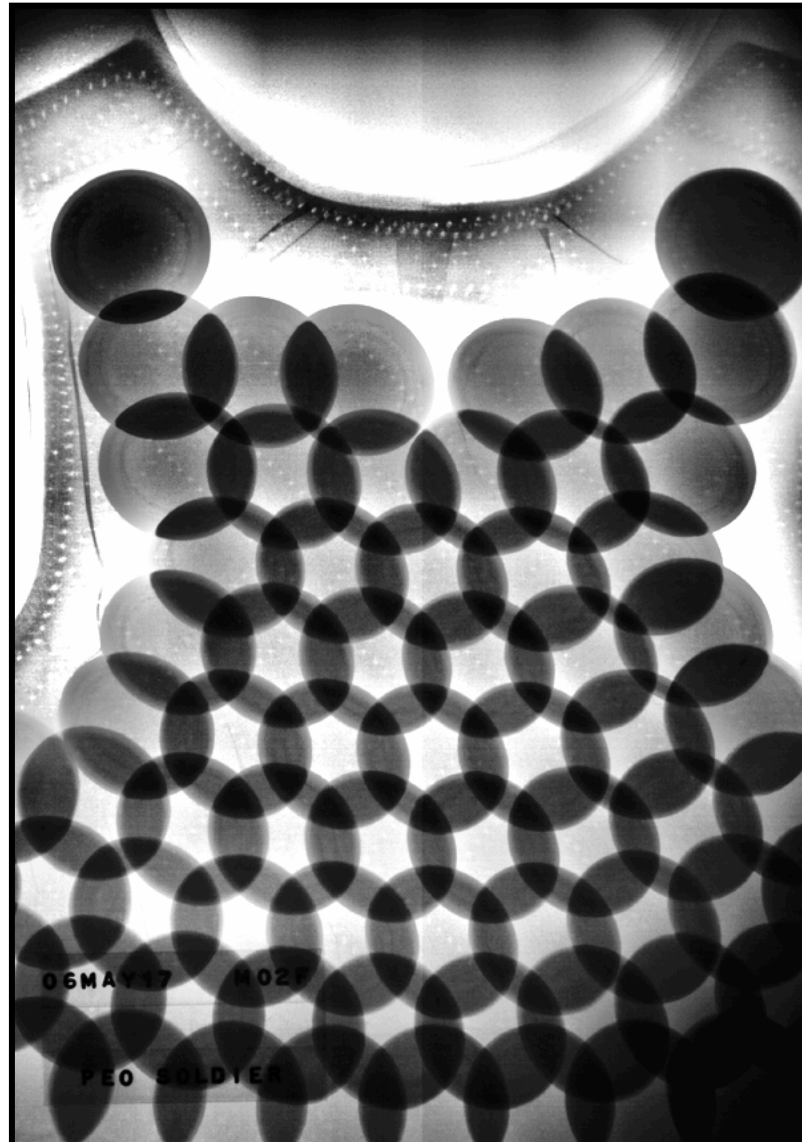
Coverage: 743 in²

* Note, due to difference in sizing "Pinnacle SOV 3000" body armor extra large is equivalent to "Interceptor Body Armor" large in size and fit.

For equivalent area of coverage, weight is 46% - 70% heavier.

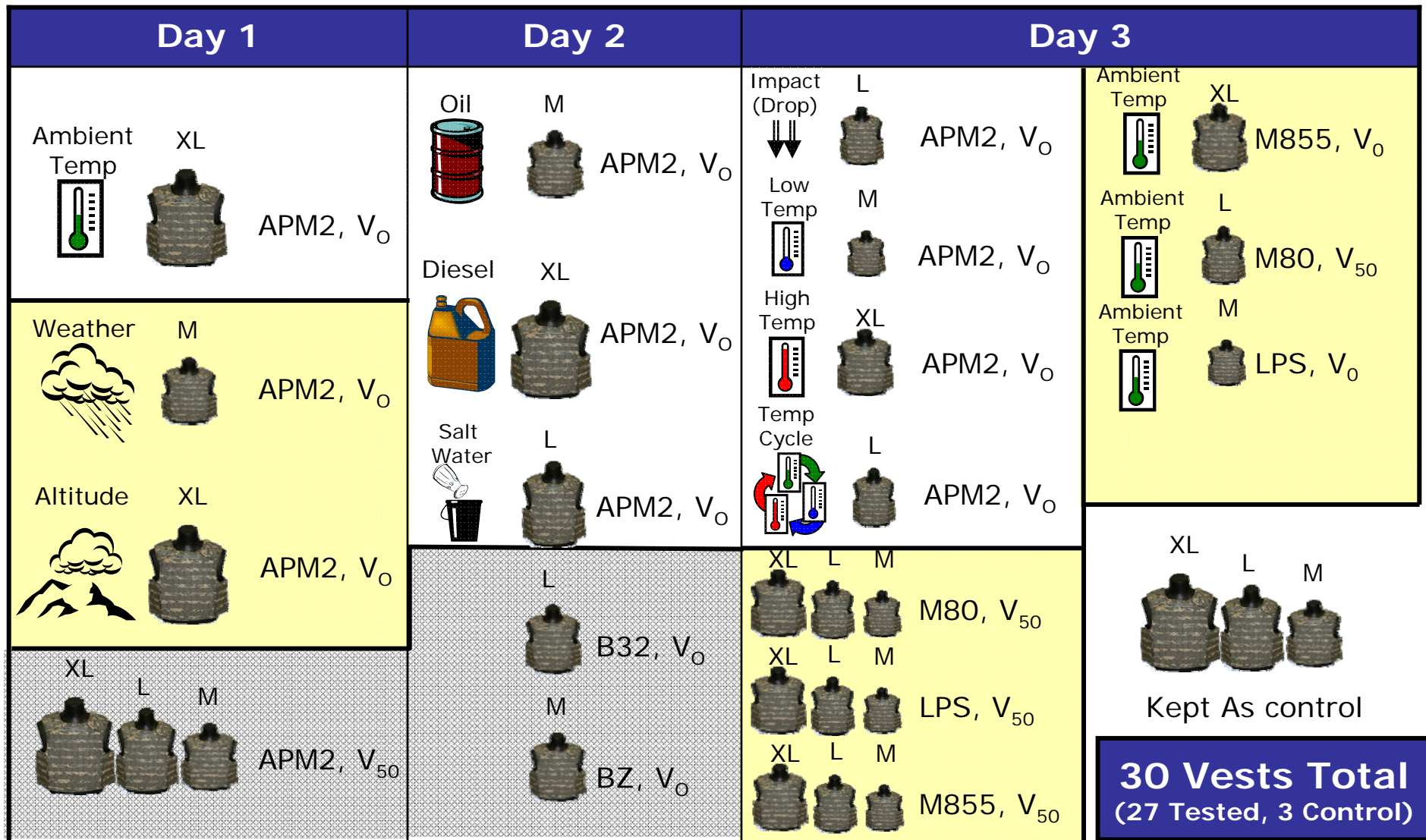


Ballistic Protection





Test Flow Chart



Test Omitted

Government Reference Only

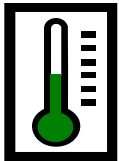
30 Vests Total
(27 Tested, 3 Control)



Ambient Temperature



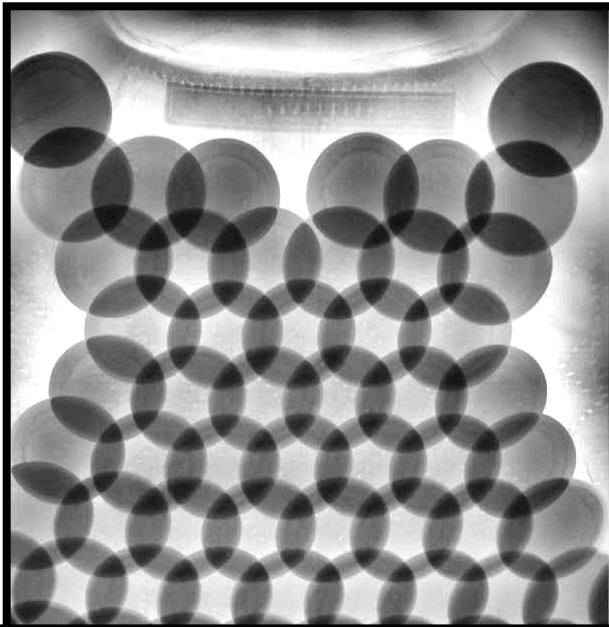
Ambient
Temp



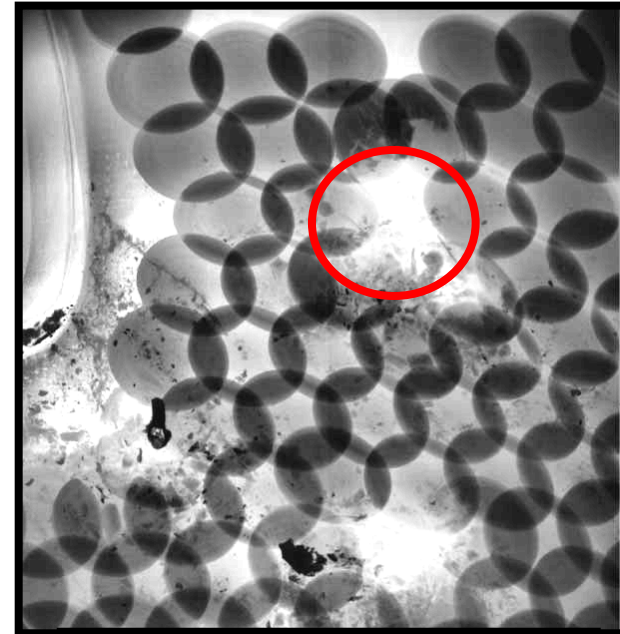
Extra Large



Vest/Panel	Result
XL-01-Front	2d shot, complete penetration
XL-01-Back	OK
XL-01-Left side	OK
XL-01-Right Side	OK



XL-01 FRONT Before Testing



XL-01 FRONT After Testing



Salt Water Exposure



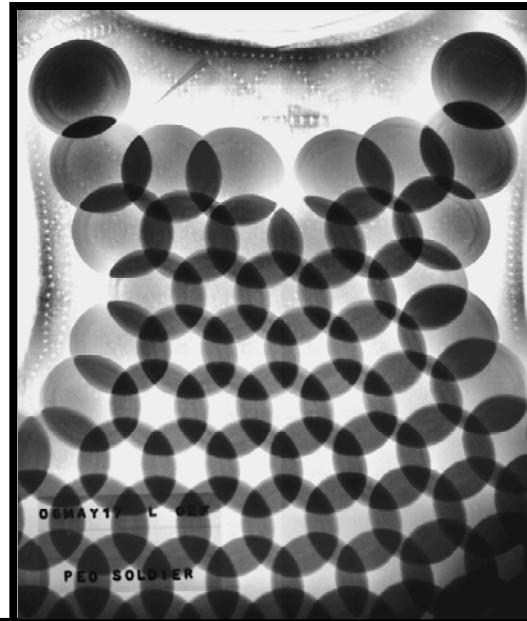
Salt
Water



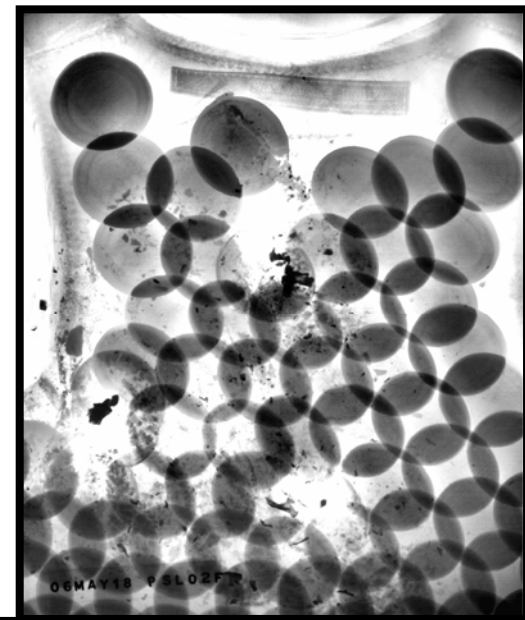
Large



Vest/Panel	Result
L-02-Front	OK
L-02-Back	OK
L-02-Left side	OK
L-02-Right Side	OK



L-02 FRONT Before Testing



L-02 FRONT After Testing



Motor Oil Exposure



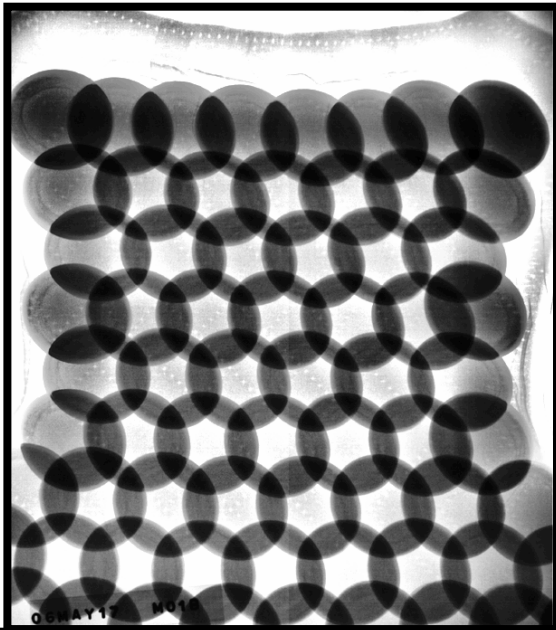
Oil



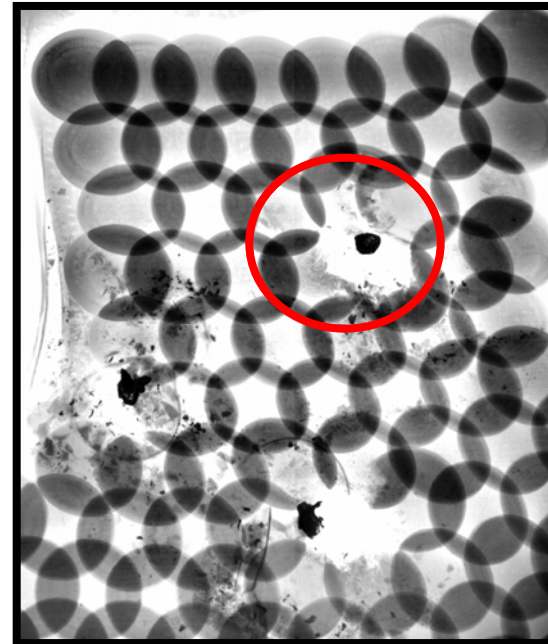
Medium



Vest/Panel	Result
M-01-Front	2d shot, complete penetration
M-01-Back	2d shot, complete penetration
M-01-Left Side	OK
M-01-01-Right Side	OK



M-01 BACK Before Testing



M-01 BACK After Testing



Diesel Fuel Exposure

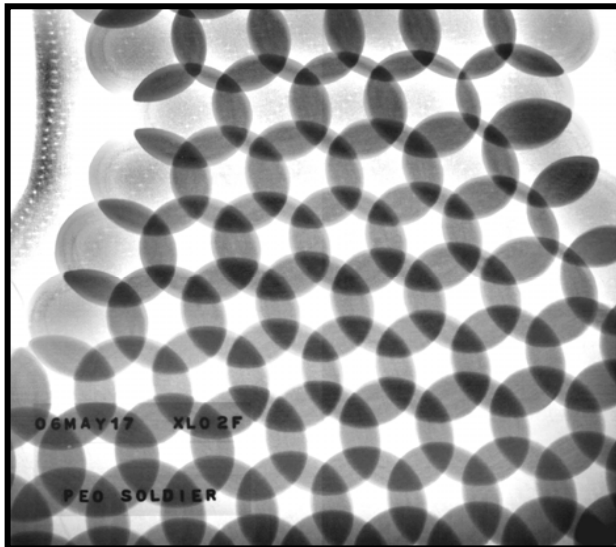


Diesel

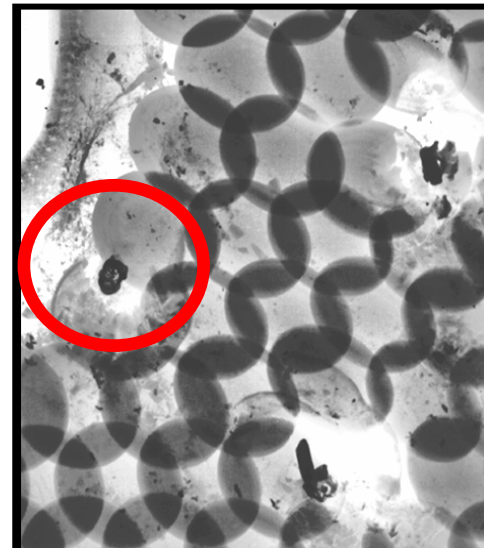
Extra
Large



Vest/Panel	Result
XL-02-Front	1st shot, complete penetration
XL-02-Back	2nd shot, complete penetration
XL-02-Left Side	OK
XL-02-Right Side	1st shot, complete penetration



XL-02 FRONT Before Testing



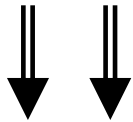
XL-02 FRONT After Testing



Impact/Drop



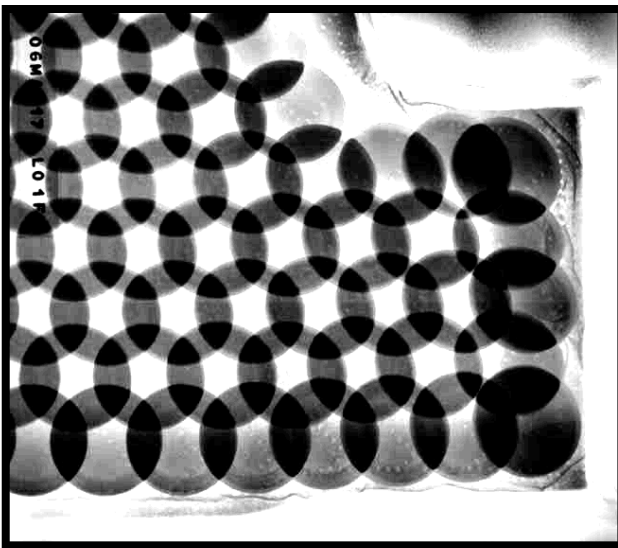
Impact
(Drop)



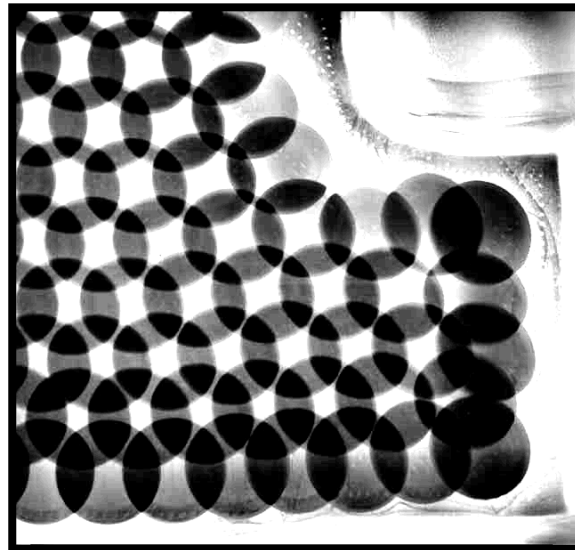
Large



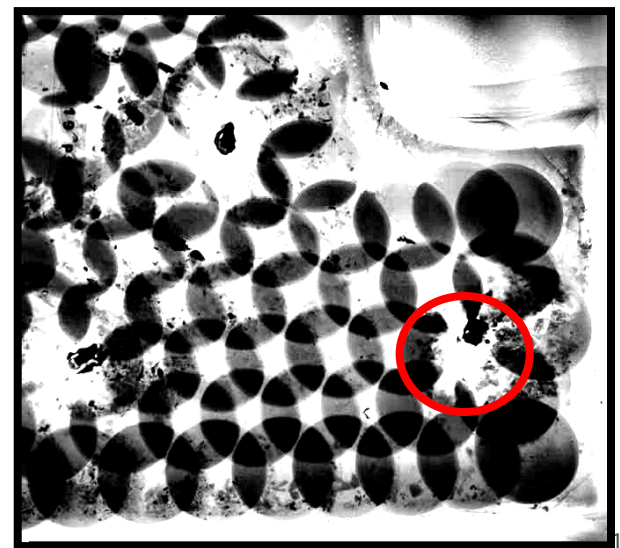
Vest/Panel	Result
L-01-Front	OK
L-01-Back	OK
L-01-Left Side	1st shot, complete penetration
L-01-Right Side	OK



L-01 Left Side Before Testing



L-01 Left Side Post Drop



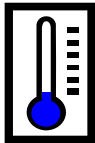
L-01 Left Side After Testing



Low Temperature (-60° F)



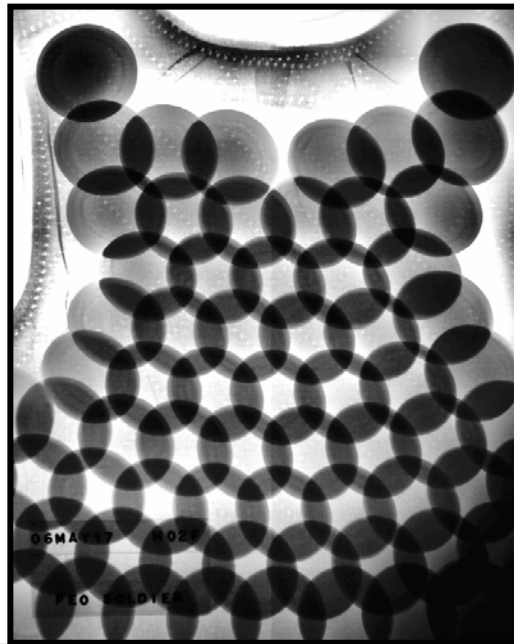
Low
Temp



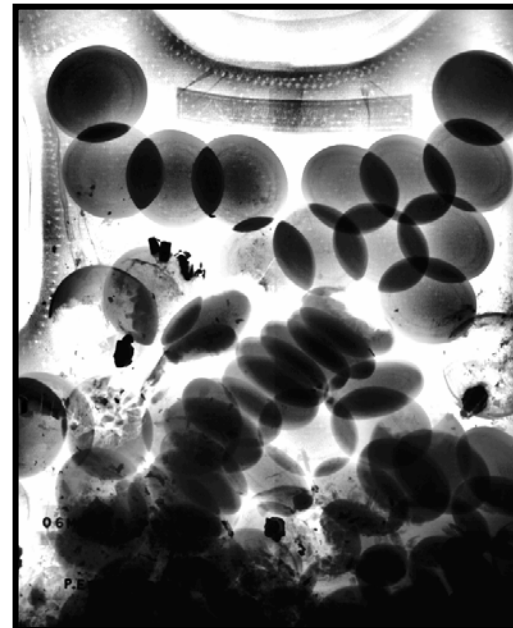
Medium



Vest/Panel	Result
M-02-Front	OK
M-02-Back	OK
M-02-Left Side	OK
M-02-Right Side	OK



M-02 FRONT Before Testing



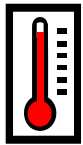
M-02 FRONT After Testing



High Temp (160° F)



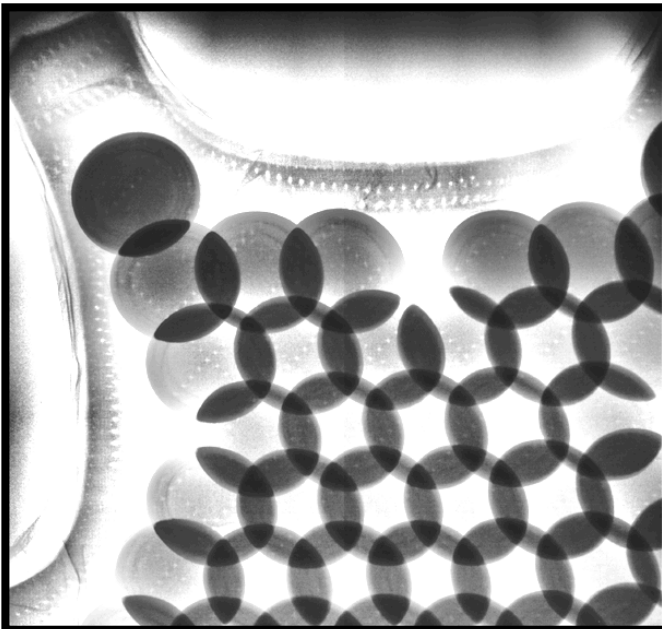
High
Temp



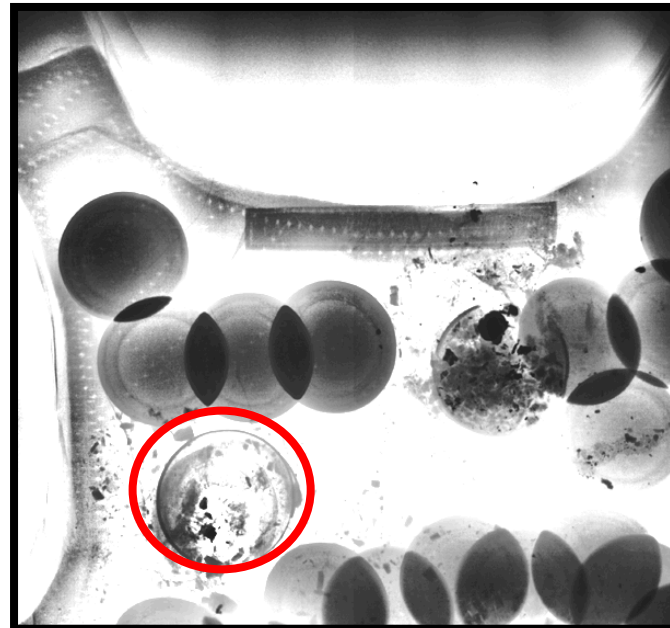
Extra
Large



Vest/Panel	Result
XL-03-Front	1st shot, complete penetration
XL-03-Back	1st shot, complete penetration
XL-03-Left Side	1st shot, complete penetration
XL-03-Right Side	1st shot, complete penetration



XL-03 FRONT Before Testing



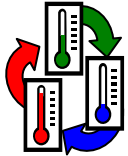
XL-03 FRONT After Testing



Temperature Cycle (-25⁰ F to 120⁰ F)



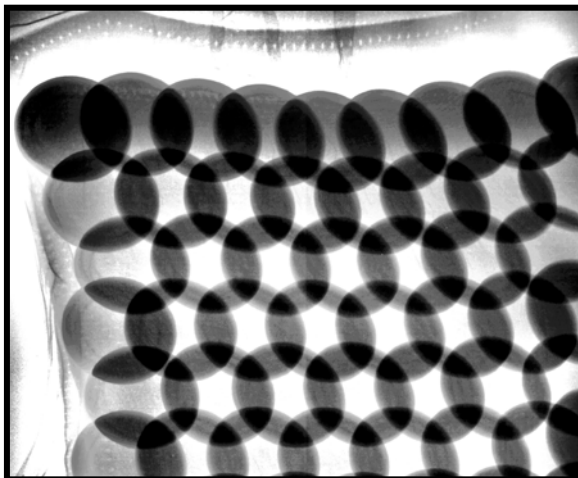
Temp
Cycle



Large



Vest/Panel	Result
L-03-Front	OK
L-03-Back	1st & 2nd shot, complete penetration
L-03-Left Side	OK
L-03-Right Side	OK



L-03 BACK Before Testing



L-03 BACK After Testing



Conclusion



■ Test results

- Total number of vests tested: 8
- Total number of vests failed: 4
- Total number of penetrations: 13 of 48

Conclusion: Dragon Skin does not meet required protection standards for Soldier use.