Detecting the IED Threat

with Walk-Through Metal Detector Technology

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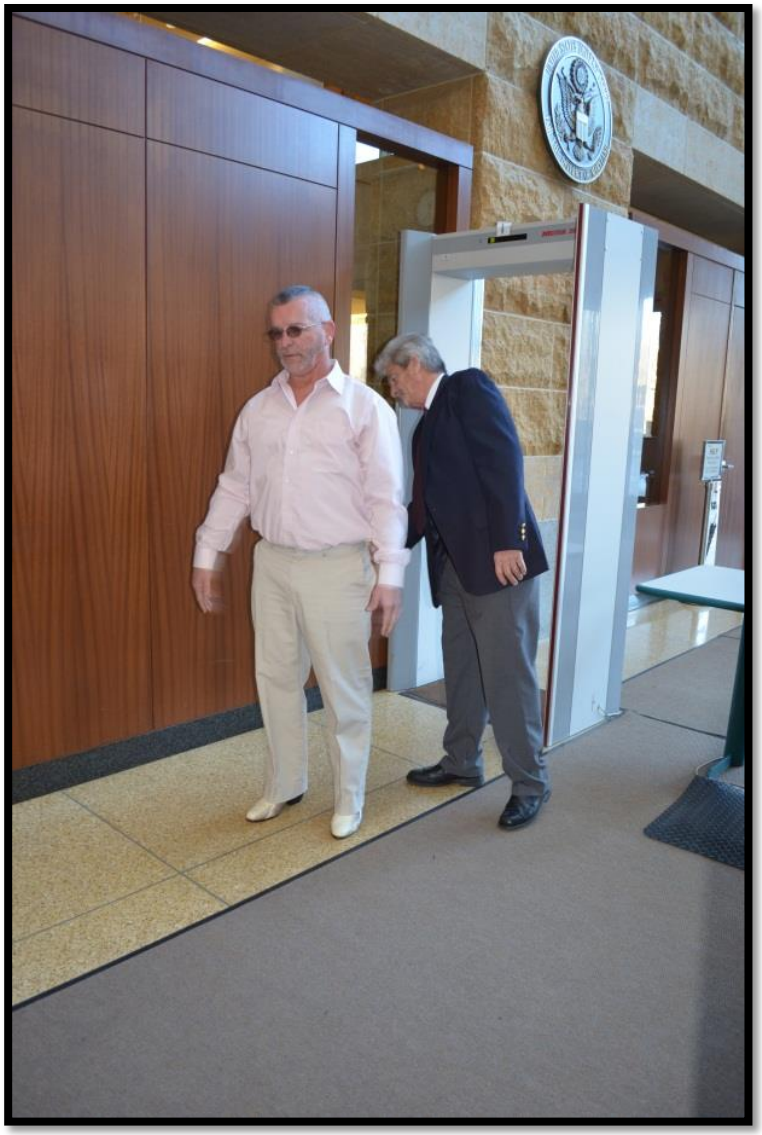
Detecting IED's with WTMD's



Why Did We Do This Testing

TSK 9540 Inert IED Clothing kit						
DSA Product	X-ray On Belt	X-ray in Bin	WTMD NAA 22 Diss-assembled	WTMD NAA 22 Assembled	Hand Held Metal Detector	Remarks
	Alarm/No Alarm	Alarm/No Alarm	Alarm/No Alarm	Alarm/No Alarm	2 inches away Alarm/No Alarm	For WTMD test list # of green deflections if the item did not alarm
CED0078 Vest with Frag	NO	NO	Yes	Yes	Yes	N/A
CED0079 Vest w/out Frag	NO	NO	NO	NO	Yes	2 to 3
CED0019 Tennis shoe IED	NO	NO	Yes	Yes	Yes	N/A
CED0035 Baseball Hat IED	NO	NO	NO	NO	Yes	4 to 5
CED0021 Sandal shoe IED	NO	NO	NO	NO	NO	0
CED0038 Heavy Jacket IED	NO	NO	Yes	Yes	Yes	N/A
CED0022 Belt IED	NO	NO	Yes	Yes	Yes	N/A
CED0020 Hiking Shoe IED	NO	NO	NO	NO	yes	1 to 3
CED0037 Light Jacket IED	NO	NO	Yes	Yes	Yes	N/A
CED 0024 Knee Brace IED	NO	NO	Yes	Yes	Yes	N/A

Because the end user wants to know how their systems will respond to threats

Study Overview

1. Role of the Metal Detector
   - Checkpoints VS Primary Instruments
   - Checkpoints VS WTMD Settings

2. Interagency Security Committee
   - IED Threats & Test Objects

Checkpoints VS Primary Instruments

Airports

Checkpoints VS Primary Instruments

Courthouses
Schools
Prisons
Events
Arenas
Businesses
Etc.

WTMD Settings used for the Testing

Events, Arenas, and Schools	***Guns Assembled, NIJ Large Objects***
Airports, Courthouses	***Guns Disassembled***
Enhanced Airports	***Guns Disassembled Knives, NIJ Medium Objects***
Prisons, Loss Prevention	***NIJ Small Objects***

Verifying WTMD Settings

NIJ 0601.01/.02 Walk Through Metal Detector Test Kit

The objects and tests in this kit are designed to maintain and improve the security of correctional facilities and public buildings, and to increase the safety of security personnel. We manufacture both the field test kit, and the test kit for computer/automated testing. These kits are particularly effective for random testing of operator alertness and training of new detector operators. Kits comply with NIJ Standard 0601.02 "Walk-Through Metal Detectors for use in Concealed Weapon and Contraband Detection" which was the result of extensive consultation with the law enforcement and correction communities. Please contact us for more detailed information.

Reference: http://www.apcorusa.com/products/nij_walkthroughmetaldetector_wtmd_test_objects_kit.html
NIJ Reference: https://www.ncjrs.gov/pdffiles1/nij/193510.pdf

Verifying WTMD Settings

We used real North American Arms 22 pistols vs Test Pieces

Assembled and Disassembled

Reference 1: https://northamericanarms.com/product-category/firearms/22-long-rifle/

Verifying WTMD Settings

No longer manufactured and company is out of business

Made from Zamak

Current Models (Cobra, Etc.) are larger and barrels are ferrous

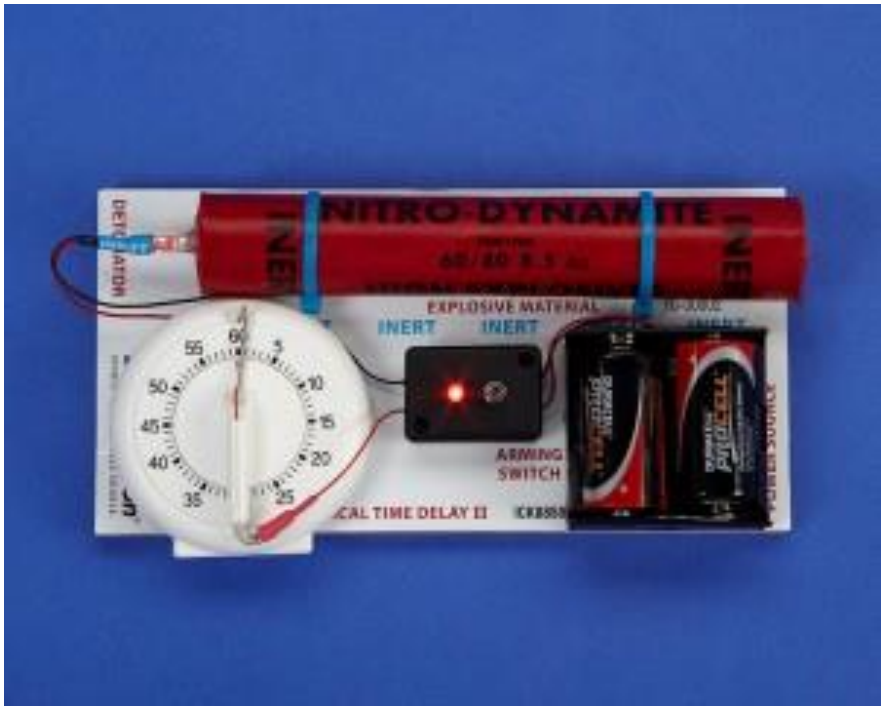
Reference 1: https://en.wikipedia.org/wiki/Davis_Industries
Reference 2: https://en.wikipedia.org/wiki/Zamak

IED Test Object Selection and Categories

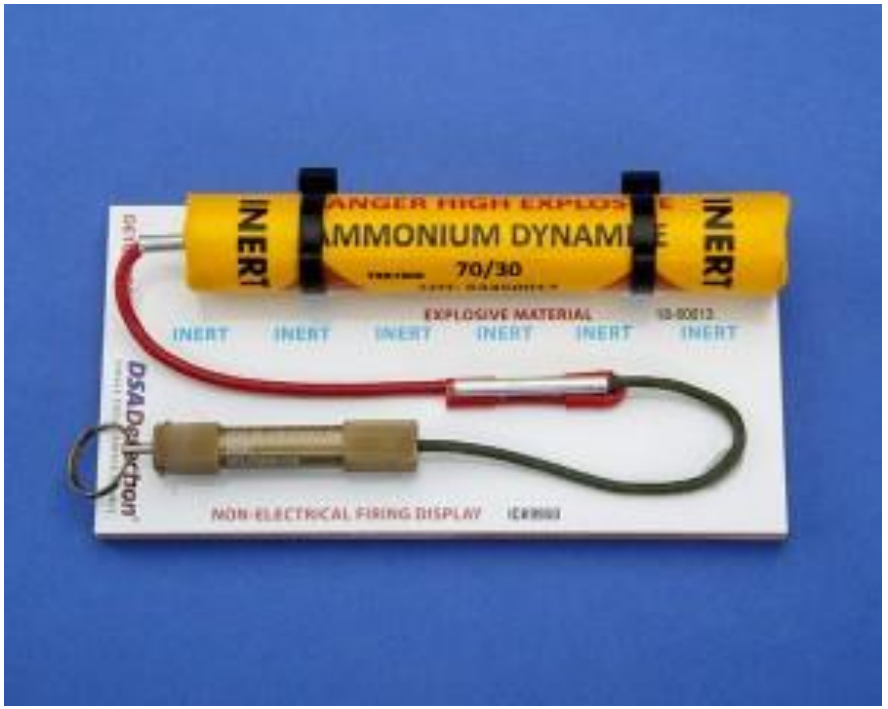
IED's are Not Considered in current Standards

2 Types of Firing Circuits

Electrical

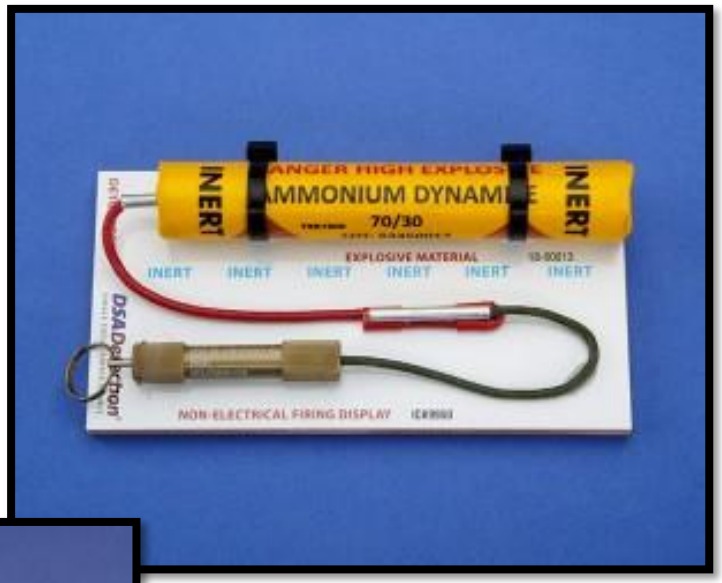


Non-Electrical



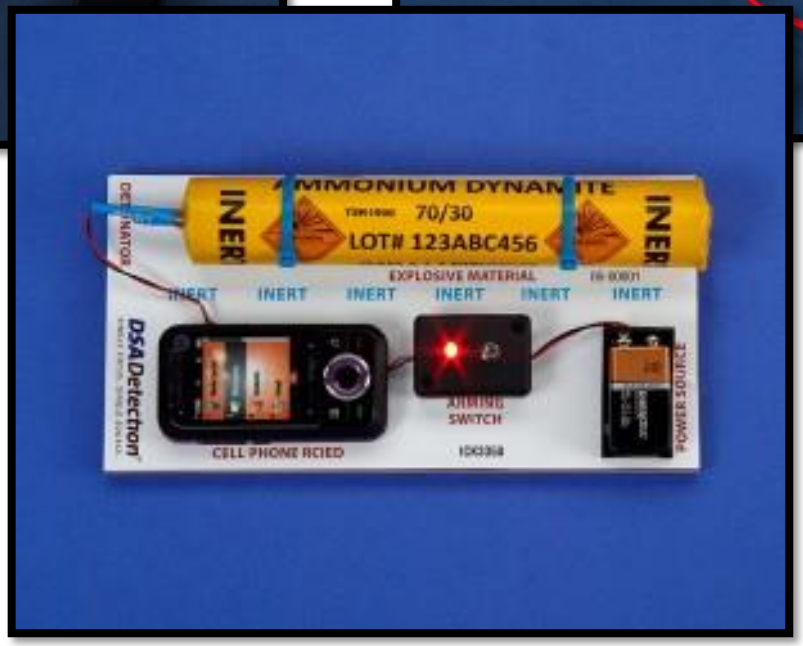
Non Electrically Initiated IED's

Example 1



Electrically Initiated IED's

Example 2



Interagency Security Committee

Undesirable Event	**7.19 Explosive Device – Suicide/Homicide Bomber**				
Definition	An explosive device carried into the facility by an adversary with the intent of reaching a specific target or area then detonating, killing or injuring the bomber and others.				
Original Assessment	12-17-09	**Revision**	0	**Date**	N
Classified Annex	YES	**Classification**	S	**Date**	10-16-09

Design-Basis Threat Scenario

A suicide/homicide bomber enters an occupied public space in the facility and detonates a suicide vest. The device consists of five pounds TNT equivalent of explosive, activated by a switch carried by the adversary. The type of explosive is known to vary widely. The device will also contain added shrapnel, such as nails, screws, nuts and bolts, or metal ball bearings (BBs).

Baseline Threat

Based on the unsophisticated nature of the attack, availability of materials and instructions, disrupted plots, and a history of suicide terrorism events occurring outside the continental United States; intelligence sources suggests some willingness by terrorists, however because this type of event has not happened in continental United States, the baseline threat to Federal facilities from this event is assessed to be **MODERATE.**

Analytical Basis

The prevalence of suicide bombings in the United Kingdom, Afghanistan, Pakistan, Iraq, Jordan, Saudi Arabia, and other countries demonstrate that suicide bombing is a preferred terrorist method of attack. These types of attacks appear to be a calculated choice by operational planners. Terrorists probably are drawn to suicide bombings because they are effective, efficient, inexpensive, and easier to execute than other tactics. Since the bomber usually dies during the mission, suicide attacks also reduce the danger of captured operatives revealing important information under interrogation.lxii Examples of these events include the following:

The Interagency Security Committee (ISC) Design Basis Threat Reference: https://info.publicintelligence.net/DHS-DesignBasisThreat.pdf

IED Test Objects

Example IED Test Objects

Top Row, Left to Right

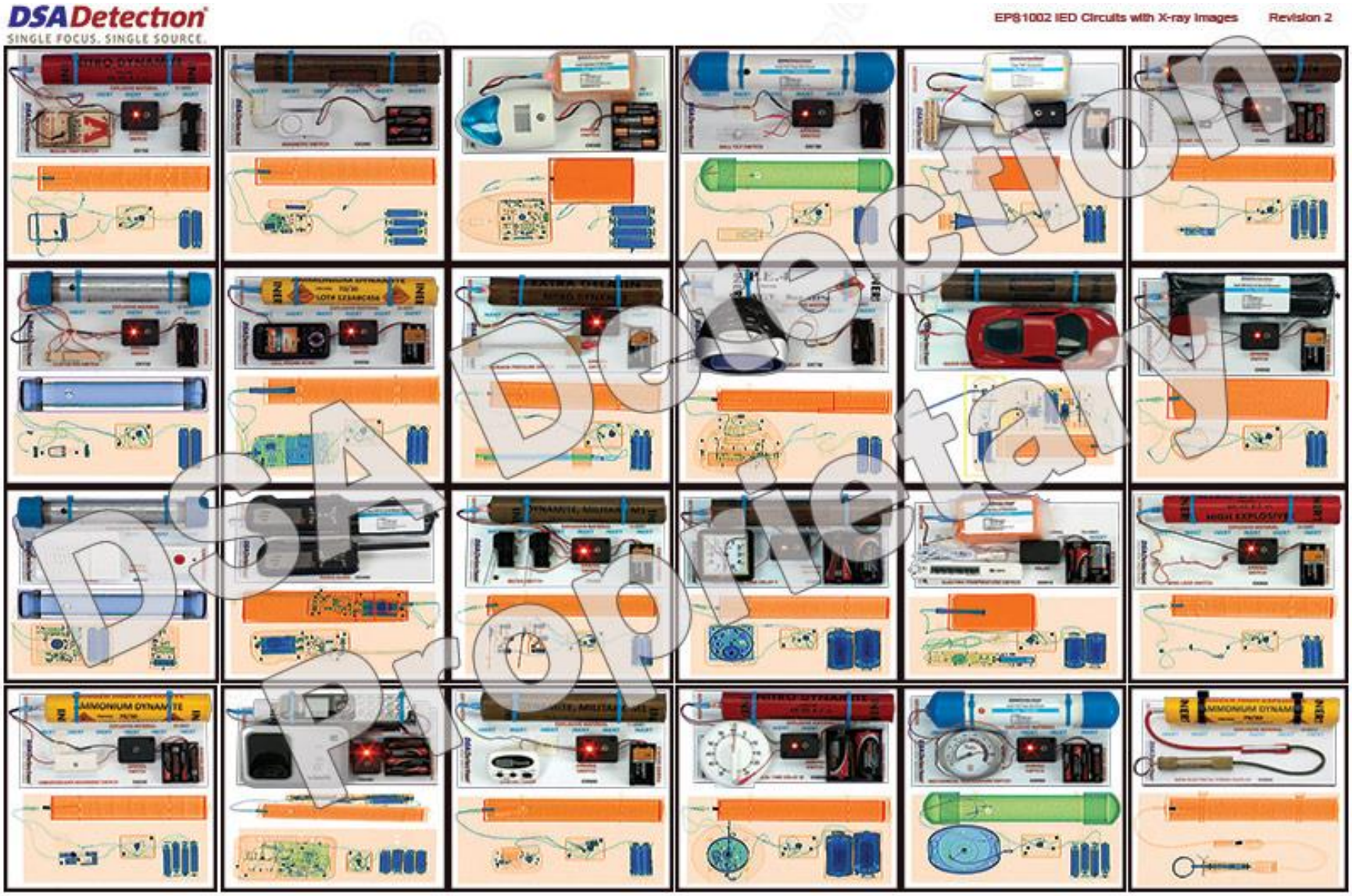
1. 1-lb. C4 with cell phone and electrical cap
2. Incendiary device w/ digital timer/cap
3. Metal pipe bomb, electrical circuit, 9V
4. PVC pipe bomb w/ nails, non-electrical
5. PVC pipe bomb, non-electrical
6. PVC pipe bomb w/ digital timer, 2AA batteries
7. PVC pipe bomb, simple electrical firing circuit

Example IED Test Objects

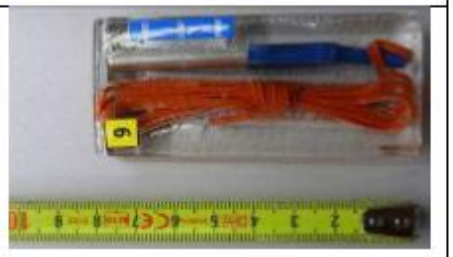
Bottom Row, Left to Right

8. M112 block C4 w/ digital timer
9. Dynamite (4 sticks) w/ timer & 2 AAA batteries
10. Dynamite (1 stick) w/ switch & 2 AA batteries
11. Dynamite (7 sticks) w/ digital timer & cap
12. Plastic explosive (2 lbs.) w/ electrical circuit
13. PE-4 (1 lb.) w/ non-electrical firing system
14. Dynamite (1 stick) w/ non-electrical firing system

Example IED Test Objects



Example IED Test Objects

ID #	ID- Description	Index	Group size	Setting	Picture
2	#2 AAA Batteries with holder	3.8	Detonators	DET-DSA	
24	DSA Aluminium CAP Fusehead (Detonator)	1.5	Detonators	DET-DSA	
23	DSA Copper Fusehead (Detonator)	1.3	Detonators	DET-DSA	
9	Aluminium Detonator	1.3	Detonators	DET-DSA	

Example IED Test Objects

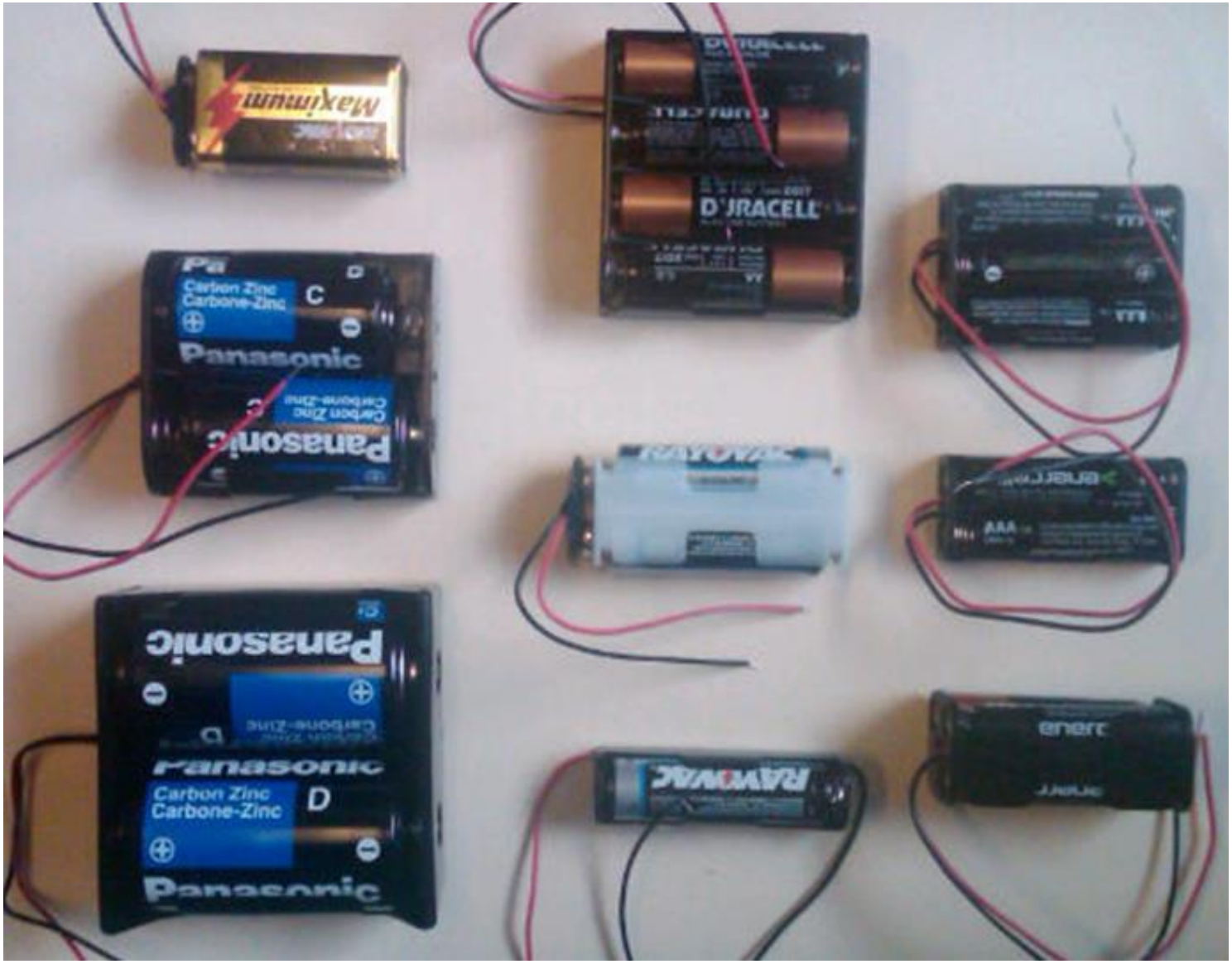
10	Copper Improvised Cap (Detonator)	1.1	Detonators	DET-DSA	

Table 1

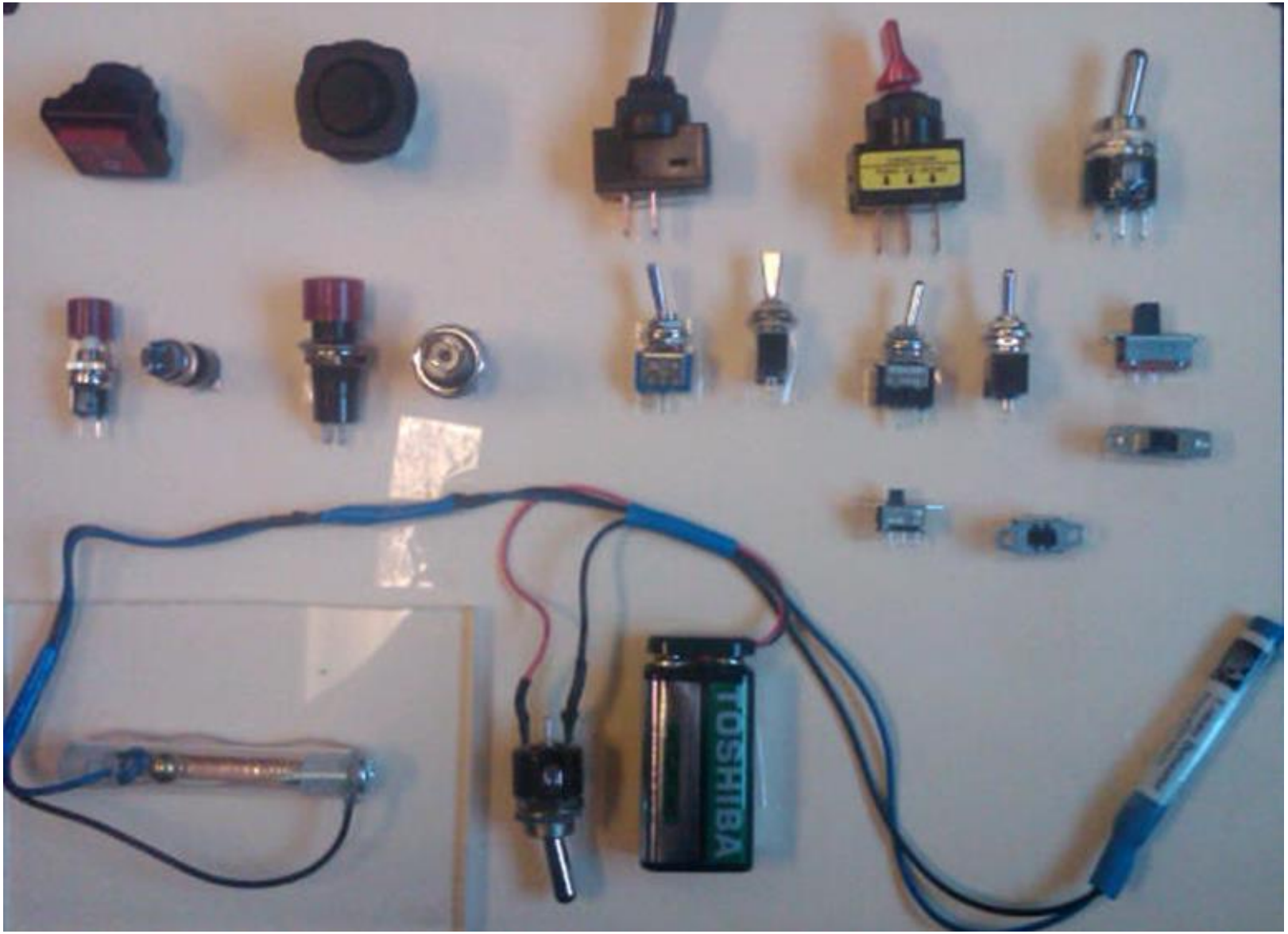
ID #	ID- Description	Index	Group Level	Setting	Picture
3	9-Volt Battery with connector	22.9	Medium Knives	MKNF-DSA	
1	#2 AA Batteries with holder	10.7	Medium Knives	MKNF-DSA	
4	#1 AA Battery	5.3	Small Knives	SKNF-DSA	

Example IED Test Objects

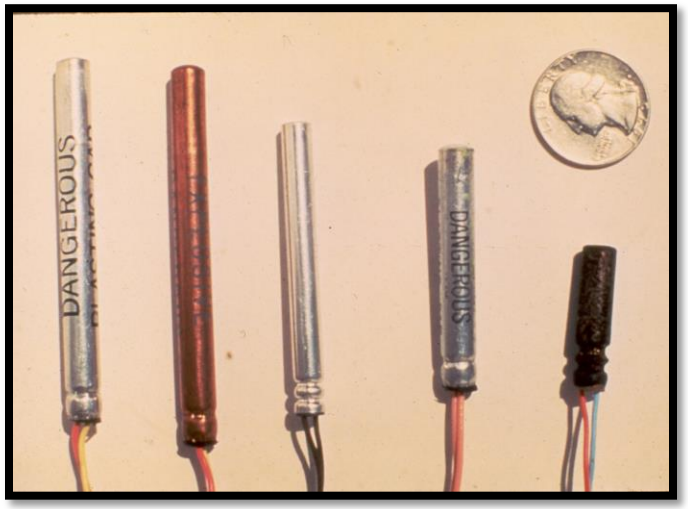
Example IED Test Objects

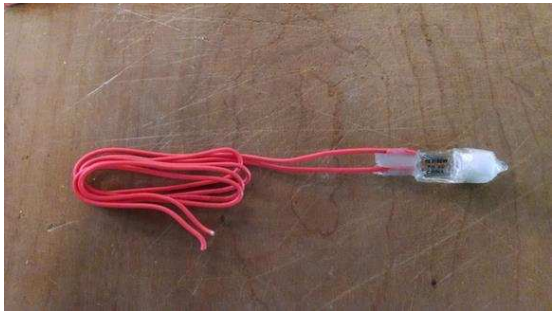


Example IED Test Objects



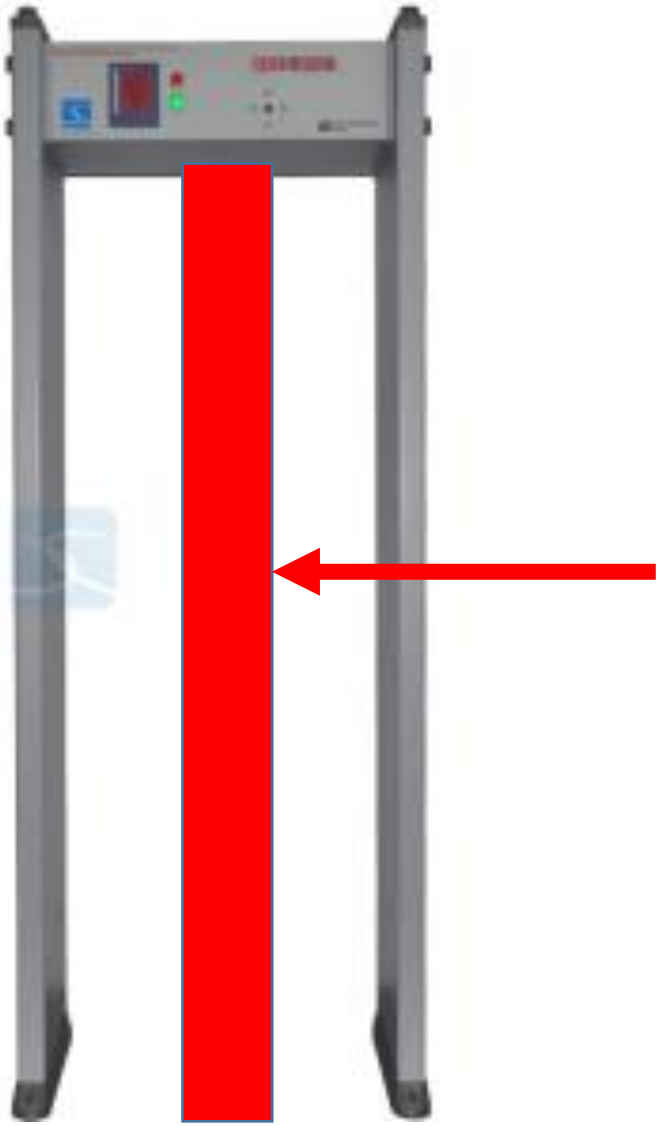
Example IED Test Objects





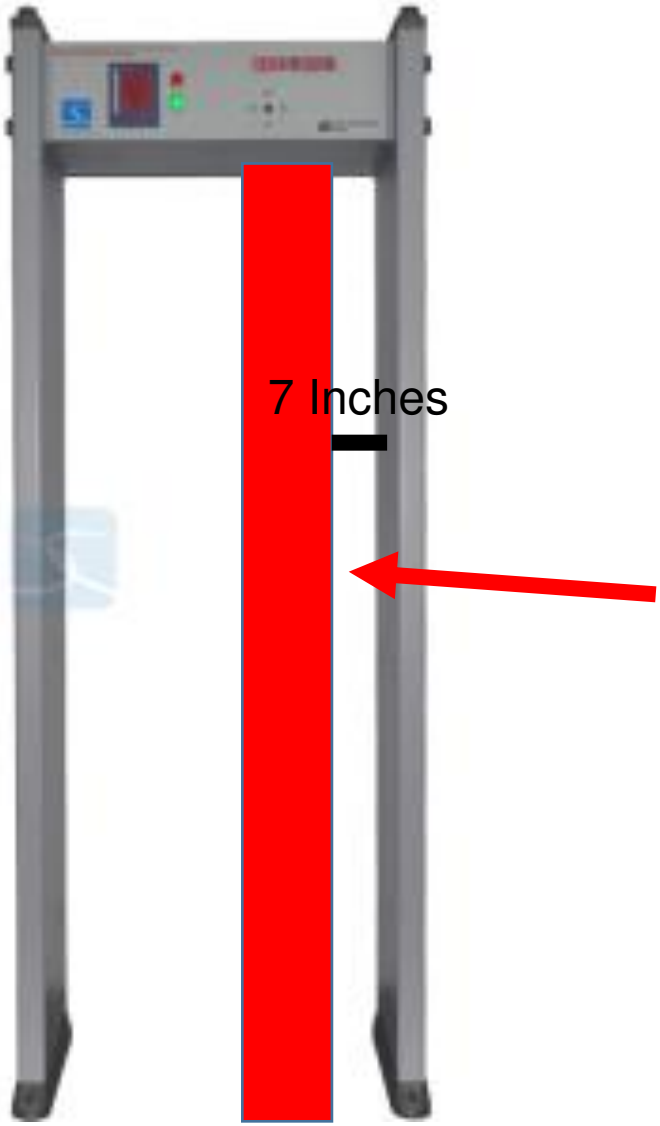
Testing Methods

Testing Methods



- Center Zone Lowest Sensitivity
- Non ADA units
- Calibration was done using center zone and most difficult orientation

Testing Methods



- **7 “ from panel**

Simulating a threat object in persons pocket

Larger test objects were also tested but in most difficult orientation

WTMD Testing: IEDs

Alarm	Unit ALARMED to test Object
No Alarm	Unit did not alarm

DSA Detection Walk Through Metal Detector Testing

Item	IED Threats	Program		Program		Program		Program		Program	
		Guns Disassembled (GD)		Guns Disassembled Knives		NIJ Large Objects (Guns)		NIJ Medium Objects		NIJ Small Objects	
		Right Pocket	Center Waist	Right Pocket	Center Waist	Right Pocket	Center Waist	Right Pocket	Center Waist	Right Pocket	Center Waist
1	D Cell - Everyready	Alarm	Alarm	Alarm	Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
2	D Cell - Energizer	Alarm	Alarm	Alarm	Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
3	C Cell - Energizer	Alarm	Alarm	Alarm	Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
4	9 Volt - Duracell Procell	Alarm	Alarm	Alarm	Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
5	AA - Energizer	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
6	AAA - Energizer	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
7	9 volt with connector	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
8	2 AA with holder	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
9	1 AA with holder	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
10	2 AAA with holder	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
11	Metal Pipe with end caps	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm
12	Metal elbow with hobby fuse	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm
13	PVC elbow with hobby fuse	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm
14	M67 hand grenade	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm
15	M26 Hand grenade	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm
16	Mk3A2 offensive hand grenade	No Alarm	No Alarm	Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
17	Fuse head blasting cap copper (2 in)	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
18	Fuse head blasting cap aluminium (2in)	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
19	Improvised copper blasting cap	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm

WTMD Testing: IEDs

20	Blasting cap electrical with wires aluminium 2.25 in (6 foot lead wires)	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
21	Complete IED Firing circuit 2 AA, switch, improvised copper detonator)	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
22	Bra bomb electrical firing circuit (9v)	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm
23	PVC - non-electrical w/ nails	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm
24	Commercial- non-elect firing	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm
25	Military non-elect firing M-60	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	No Alarm
26	Stick dynamite-simple elect-2 AAA bat	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
27	4 sticks dynamite-dig timer - 2 AAA bat	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
28	PVC pipe bomb cannon fuse	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm
29	PVC Pipe bomb - simple elect - 1 AA bat	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
30	PVC Pipe bomb - dig timer - 2 AAA bat	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
31	m-112 block - dig timer 1 AA bat	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
32	2 blocks C4 - mouse trap - 2 AAA bat	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
33	Components separated w AA battery	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
34	Card board TATP cap	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm
35	light bulb initiator	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm
36	E-match squib	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm

WTMD Testing: IEDs

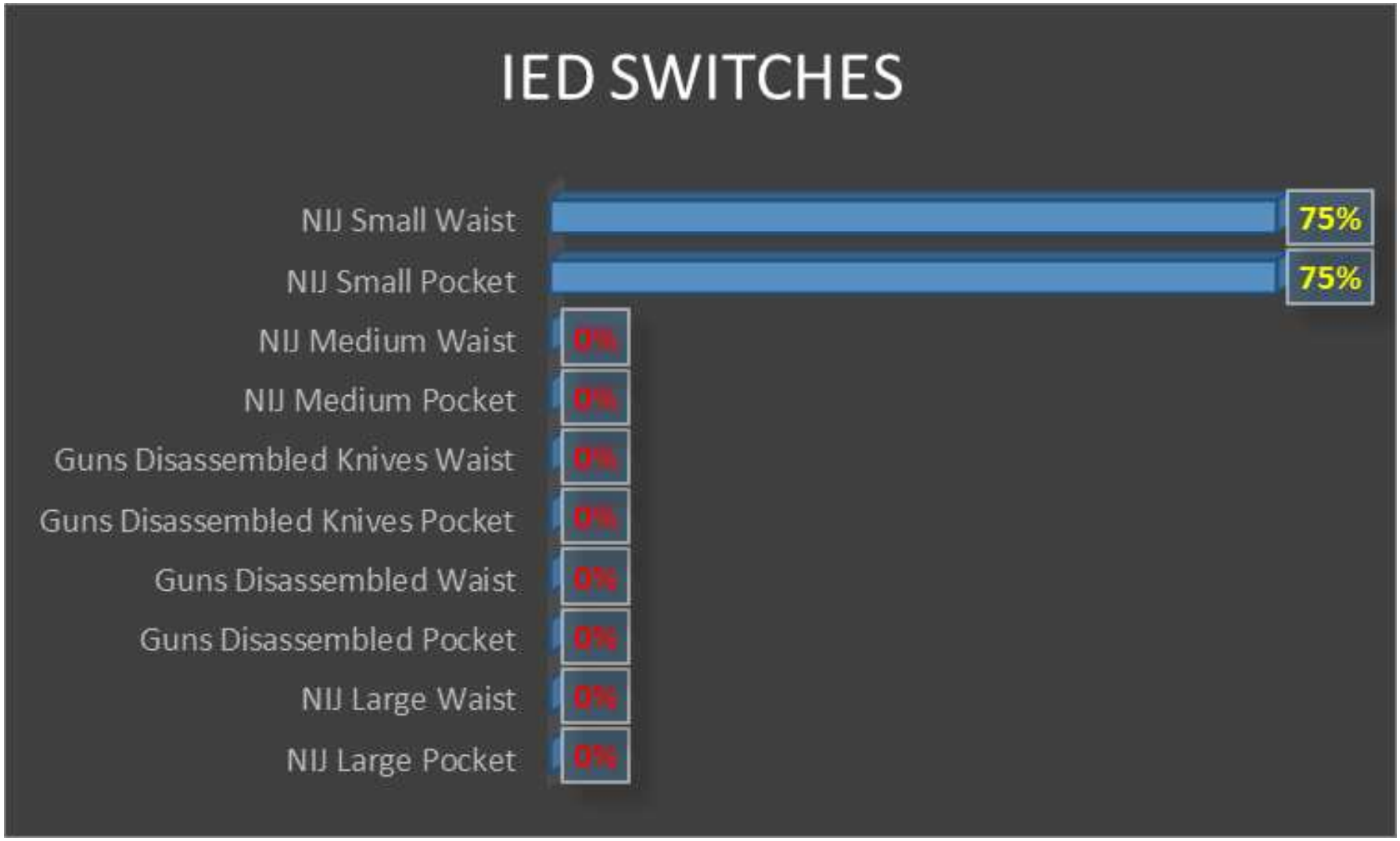
37	Small IED toggle switch	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
38	Suicide vest 2 pounds C-4 no frag (2 AAA batteries, toggle switch, commercial blastig cap)	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
39	Suicide vest 2 pounds C-4 with metal frag	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm
40	Inert Black Powder PVC Pipe Bomb with glass fragmentation 2AAA, digital timer	No Alarm	No Alarm	Alarm	Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
41	TNT Block 1/2 pounds with Detonator (metal caps)	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
42	M112 Block with Detonator	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
43	Nitro-Dynamite with Detonator	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm
44	Inert Cell Phone IED	No Alarm	No Alarm	Alarm	Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
45	Inert Electrical razor IED	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
46	Inert Hair Spray IED	No Alarm	No Alarm	Alarm	Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
47	Inert Tennis Shoe IED	Alarm	No Alarm	Alarm	No Alarm	Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
48	Inert Women's boot IED	Alarm	No Alarm	Alarm	No Alarm	Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
49	Inert Eyeglasses case IED	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
50	Inert Book IED	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm
51	Inert Tablet IED	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	No Alarm	Alarm	Alarm	Alarm	Alarm
52	Inert Smart Phone IED	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm

Close to 100 total test object were used for the testing

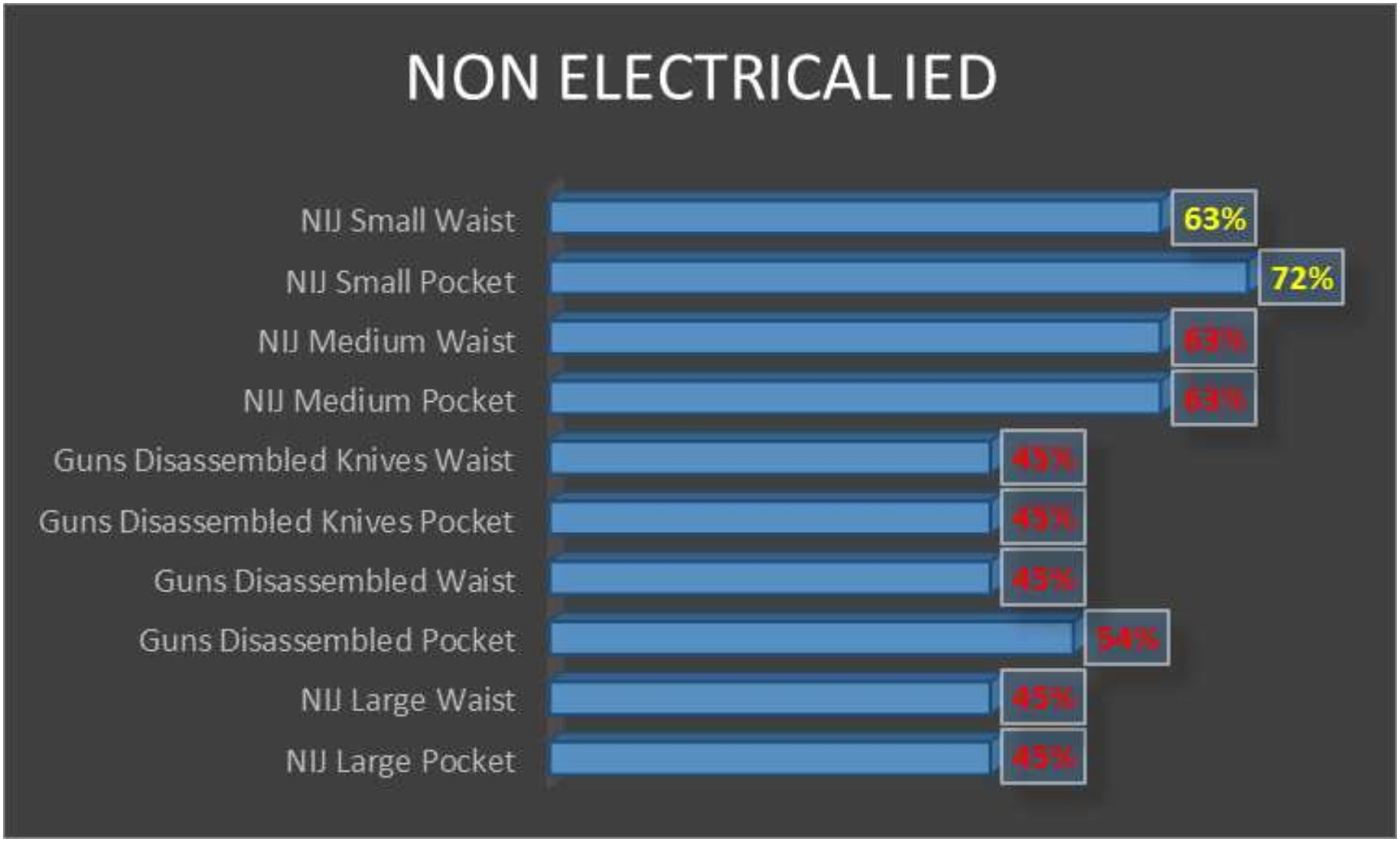
Testing Results

IED Detonators/Initiators

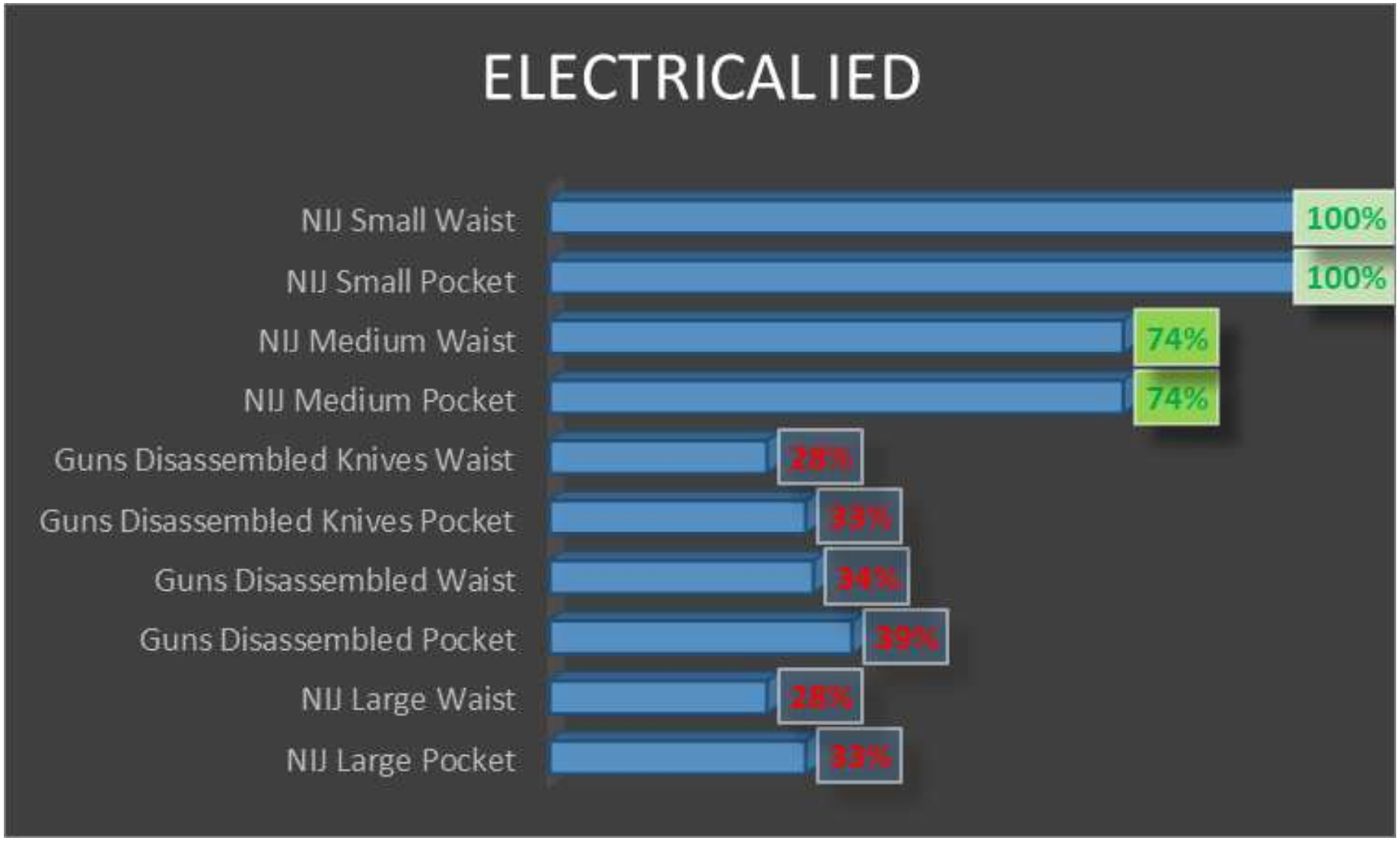
IED Switches



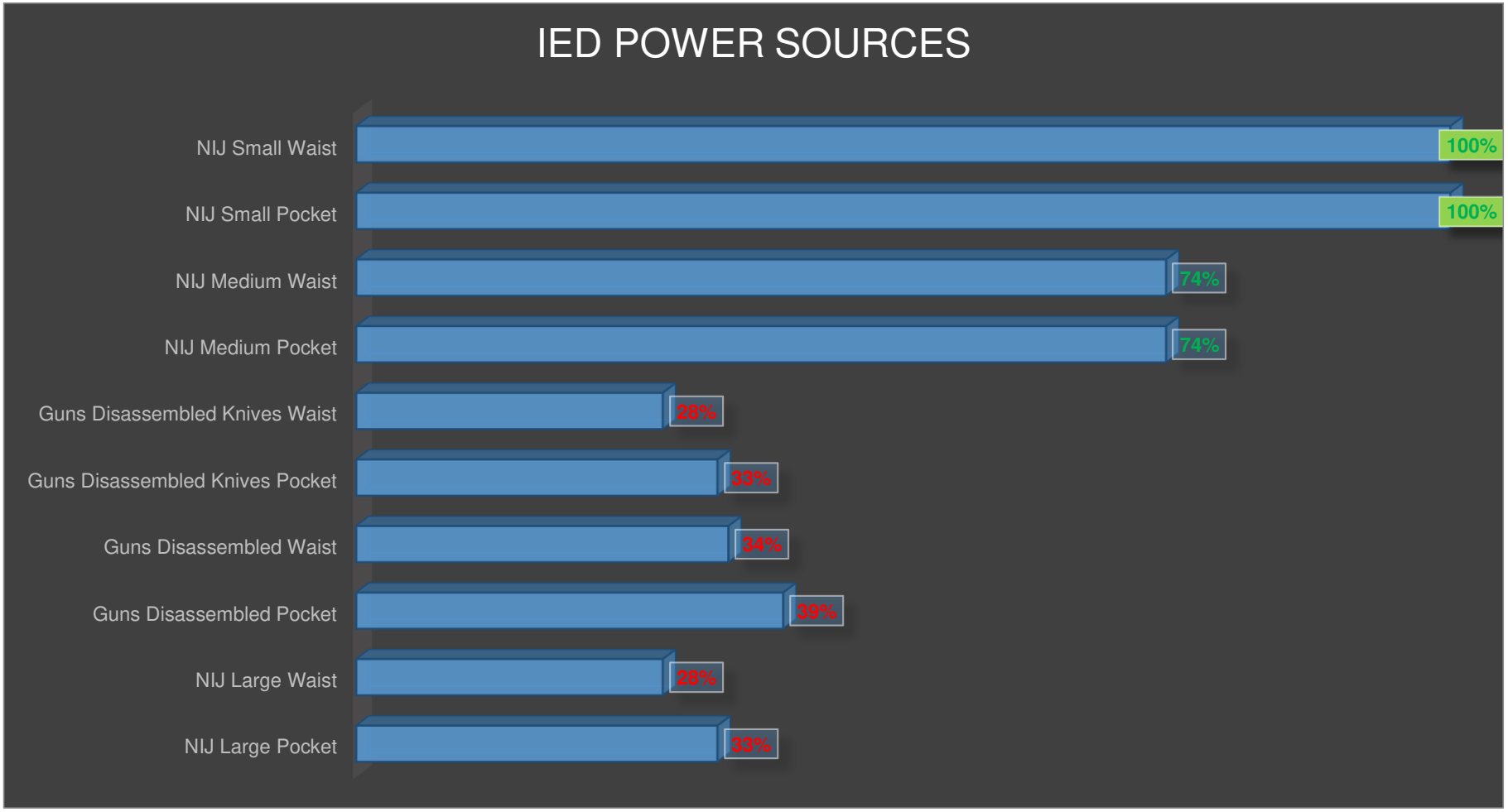
Non Electrical IED's



Electrical IED



IED Power Sources



Conclusions

Conclusions

The IED Threat CAN be detected successfully by a WTMD but the units must run at a higher level of sensitivity

For Electrically Initiated IED's the Power Source appears to be the main IED component with a detectable metallic mass

Metallic Fragmentation increases sensitivity of the IED and makes it detectable at less sensitive settings.

Conclusions

There is a need to develop standards/test objects for IED threats like we have for Guns and Knives.

A US standard needs to include the detection of a IED type threat and recommended settings.

Education is KEY in creating a more comprehensive understanding of the threat and how it will respond in a detection system

Conclusions

You Cannot Discriminate and still detect a IED threat

Questions