TEST AND EVALUATION OF HAND-HELD CELL PHONE DETECTION DEVICES

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TEST AND EVALUATION OF HAND-HELD CELL PHONE DETECTION DEVICES GUIDEBOOK

Prepared for National Law Enforcement and Corrections Technology Center

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June 2015

This publication was prepared by the National Law Enforcement and Corrections Technology Center's Corrections Technology Center of Excellence, supported by Cooperative Agreement 2010-IJ-CX-K003 awarded by the U.S. Department of Justice, National Institute of Justice (NIJ). Points of view or opinions contained within this document are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice. Please note that providing information on law enforcement and corrections technology or the mention of specific manufacturers, products or resources does not constitute the endorsement of the U.S. Department of Justice or its component parts. Agencies are encouraged to gather as much information as possible from multiple sources and make their own determinations regarding solutions that best fit their particular needs.

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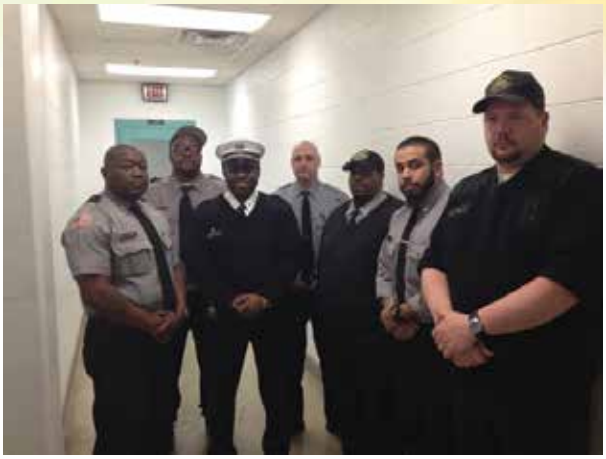
ACKNOWLEDGEMENTS

The National Law Enforcement and Corrections Technology Center (NLECTC) Corrections Technology Center of Excellence (CX CoE) would like to acknowledge the cooperation and assistance provided by John E. Wetzel, Secretary of the Pennsylvania Department of Corrections (PA DOC). He supported this endeavor by offering the State Correctional Institution at Chester (SCI-Chester) as the host site for this research. The CX CoE also appreciates the generous support of SCI-Chester Superintendent John C. Thomas and Superintendent's Assistant Louisa Perez. Intelligence Gathering Captain Lee Colston (now retired) and Security Lieutenant (now Captain) Thorton Felder committed Corrections Officers (listed alphabetically) Charles Andrews, Kurt Coons, Carmine Duncan, Val Fedena, David Friend, Felicia Hutton, Wanda Manson Johnson, Darnell Page, Bill Posada, Thomas Privott, Charles Prosser, Alex Rosario and Mike Velazquez to two days of training and five days of testing. These officers demonstrated their professionalism and commitment to excellence throughout the tedious baseline testing and the arduous practical test and evaluation phases. Their collective efforts are much appreciated.

The CX CoE is also indebted to Lars Ericson, Ph.D., the director of Advanced Technologies for the Mission, Cyber and Intelligence Solutions Group at ManTech International Corporation. Dr. Ericson was instrumental in the development of the test and evaluation protocols. He freely gave of his time and contributed his scientific expertise to the review of numerous drafts. His efforts are appreciated.



Left to Right: Carmine Duncan, CO1; Darnell Page, CO1; Lee Colston, CO4; Mike Velazquez, CO1; Thomas Privott, CO1; Bill Posada, CO1; and Val Fedena, CO1. Missing from photo: Charles Andrews, CO1; Kurt Coons, CO1; David Friend, CO1; Felicia Hutton, CO1; Wanda Manson Johnson, CO1; Charles Prosser, CO1; and Alex Rosario, CO1.

FOREWORD

This test and evaluation of hand-held cell phone detection devices was developed by the National Law Enforcement and Corrections Technology Center's (NLECTC) Corrections Technology Center of Excellence (CX CoE).

Operated by the University of Denver (DU), the CX CoE serves as the authoritative resource within the NLECTC System for both practitioners and developers with respect to technologies that support institutional and community corrections. The Center's position within DU allows it to leverage a wide array of multi-disciplinary research units to accomplish its mission.

In its prmary role, this CoE assists in the transition of technology from the laboratory into practice by first

Source: Louisa Perez, Superintendent's Assistant, SCI-Chester, 2014.

adopters within the correctional community. Specifically, the CX CoE supports NIJ's research, development, test and evaluation activities within the corrections portfolio by:

- Assisting NIJ in identifying practitioner technology requirements by coordinating and conducting Technology Working Groups (TWGs).
- Supporting NIJ research and development programs by assisting with program objective definition and refinement, assessing ongoing NIJ projects, scouting relevant technology efforts and participating in national and regional groups.
- Testing, evaluating and demonstrating technologies by conducting and coordinating operational evaluations and conducting, facilitating and coordinating demonstrations with corrections agencies.
- Supporting the adoption of new technologies by introducing these tools to practitioners, providing practitioner requirements to developers, assisting developers in commercialization and providing support to first adopter agencies for effectiveness evaluation.
- Coordinating and developing technology guidelines for planning, selecting and implementing technology solutions.
- Providing technology assistance and support to corrections agencies on a national basis, including providing science and engineering advice and assisting first adopters with new tools and methods.

EXECUTIVE SUMMARY

This test and evaluation (T&E) of hand-held cell phone detection devices was developed for the National Institute of Justice (NIJ) based on a recommendation from its Institutional Corrections Technology Working Group (TWG). The TWG consists of leaders from local, state and federal correctional agencies across the country. Members recognized the importance of conducting an operational T&E of the various technologies marketed to combat the problem of contraband cell phones in correctional facilities.

The TWG members noted that there are different hand-held technology solutions, each with its own strengths and operational limitations. Some hand-held devices are designed to detect cell phones only when they are "ON." They are not capable of detecting cell phones that are "OFF." Other devices are designed to detect cell phones that are either "ON" or "OFF." The preferred technology solution must be driven by the concept of operations. The reader is cautioned against making direct comparisons of hand-held cell phone detection devices with dissimilar technology solutions. A multi-layered approach that includes sound policies, procedures, practices and proven technology solutions continues to be the recommended best practice for combatting contraband cell phones in correctional facilities.

The U.S. Department of Justice (DOJ) and its National Institute of Justice (NIJ) issued a Federal Register Notice (FRN) soliciting equipment suppliers interested in participating in this evaluation to execute a letter of understanding to loan their equipment to the CX CoE for a period not to exceed 90 days. (See Appendix L, DOJ/NIJ Federal Register Notice, 2013.) The TWG and the FRN operationally defined "hand-held cell phone detectors" as devices that:

- Weigh less than eight pounds.
- Are battery operated with a minimum run time of two hours.
- Are designed for single person operation.
- Operate using radio frequency (RF) and/or non-linear junction detection (NLJD) technology.

In response to the FRN, two vendors provided their hand-held cell phone detection equipment for T&E (see Exhibit 1):

Exhibit 1. Hand-Held Cell Phone Detection Devices Subjected to Test and Evaluation

Vendor	Device™ Name	Technology
Berkeley Varitronics Systems (BVS)	MantaRay™	Ferromagnetic Detection (FMD)
Berkeley Varitronics Systems (BVS)	PocketHound™	Radio Frequency Detection (RFD)
Berkeley Varitronics Systems (BVS)	WolfHound Pro™	Radio Frequency Detection (RFD)
Research Electronics International (REI)	Orion 2.4™	Non-Linear Junction Detection (NLJD)

Each of the devices was subjected to extensive baseline testing designed to establish its ability to detect cell phones concealed in simulated common hiding places (cardboard storage boxes, concrete blocks, peanut butter jars, wrapped in aluminum foil; see Exhibit 2). The baseline tests were conducted at the Pennsylvania Department of Corrections (PA DOC) State Correctional Institution at Chester (SCI-Chester) facility following a structured script to ensure that all four devices were tested against all targets in all four vessels. At the conclusion of each test, the corrections officer who conducted the test recorded whether there was an alert, the range of detection (in feet/inches) and whether it was a true alarm or a false alarm.

Baseline testing clearly established that both the NLJD and FMD devices could not detect cell phones from 10 feet or farther outside the cell. This distance has been operationally defined as the distance from which a corrections officer would attempt to detect a contraband cell phone while making routine foot patrols around the inmate housing unit. Therefore, only the RFD devices were subjected to carefully scripted Patrol Scenario Tests, which involved corrections officers making routine patrols around the inmate housing units as they normally would for head counts and security/safety checks (see Exhibit 3). At the conclusion of each Patrol Scenario Test iteration, officers recorded the following data:

- Nature of each alarm: True (Cell Phone)/False (AED)/False (Other).
- Correct cell identified by operator: Yes/No/Undetermined.
- Time to walk patrol (in minutes).

These tests established that the RFD devices provide excellent detection and directional indicators when the target cell phones are in the ON/Active mode (i.e., actively engaged in a phone call). On average, the RFD devices located an ON/Active cell phone within four minutes of the time that the officer entered the housing unit. This time includes the time that it takes to walk to the cell, open the cell door and locate the target cell phone. The RFD devices will detect the presence of RF activity in the vicinity when the target cell phone is in the ON/Standby mode, but will be of little value in locating the target cell phone until it is placed in the ON/Active mode. The RFD devices are of no use in detecting or locating cell phones in the OFF mode.

Exhibit 2. Baseline Test Vessels

Left to right: aluminum foil, peanut butter jar, cardboard storage box, concrete block

Source: CX CoE, 2014

Exhibit 3. Patrol Scenario Tests

Patrol Scenario Test with the BVS WolfHound Pro™ (RFD Device)

Source: CX CoE, 2014

All four hand-held cell phone detection devices were subjected to Cell Search Scenario Tests (see Exhibit 4). These scripted tests were designed to test the ability of the devices to locate contraband cell phones in an operating prison environment when they are concealed in common inmate hiding places.

At the conclusion of each Cell Search Scenario Test iteration, the officers recorded the following data:

- Time to conduct the cell search (in minutes).

Exhibit 4. Cell Search Scenario Tests

Cell Search Scenario Test with the BVS WolfHound Pro™ (RFD Device)

Source: CX CoE, 2014

- Nature of each alarm: True (Cell Phone)/False (AED)/False (Other).
- Found phone: Yes/No.
- Accuracy of any directional information.

Note that in both the Patrol Scenario Tests and the Cell Search Scenario Tests, officers recorded the time to conduct the patrol or the cell search. Practitioners (both subject-matter experts, or SMEs, and TWG members) were interested in learning whether the use of these hand-held cell phone detection devices would enhance or impede the operational efficiency of Search Team officers. It is difficult to draw any firm conclusions in this regard due to the lack of baseline data (i.e., the average amount of time to complete a foot patrol or a cell search without a hand-held cell phone detector over a period of time) and all of the uncontrollable variables affecting how long it takes a corrections officer to complete a patrol or a cell search. It did seem apparent that the devices with a high false alarm rate (FAR) were frustrating to the users and impeded their progress.

The T&E revealed the strengths and limitations of each technology (see Exhibit 5).

The FMD and NLJD devices can detect cell phones that are turned off. They are, however, subject to false alarms, and they require the operator to be very close (approximately 0-8 inches) to the target cell phone before a positive alert is received. They provide very little (if any) directional indication to the operator.

The RFD devices can detect only cell phones that are turned on. They cannot detect cell phones that are turned off. Although the detectors will alert on cell phones in the ON/Passive (standby) mode, they provide no directional indication due to the fleeting nature of the way cell phones communicate with cell towers when in standby mode. The RFD devices provide excellent detection and directional indicators when the target cell phones are in the ON/Active mode (i.e., actively engaged in a phone call).

After 60 days of hands-on operational evaluation, the corrections officers who tested the four hand-held cell phone detection devices were asked to select the one

Exhibit 5. Strengths and Limitations Dashboard for Three Technology Solutions

Strengths	Technology Solutions		
Limitations	FMD	NLJD	RFD
Able to Detect Phones in Off Mode	Y	Y	N
Able to Detect Phones in On/Active Mode	Y	Y	Y
% Accuracy of Detecting Off Phones	46% TAR 8% FAR	58% TAR 17% FAR	0%
Detection Range (Phones On/Active)	0- 7 in.	1- 8 in.	70-125 ft.
Directional Accuracy (Phones On/Active)	Poor	Good	Excellent

Source: CX CoE, 2014

device that they would buy. Eighty-three percent chose the BVS PocketHound™ (RFD) and 17 percent chose the BVS WolfHound Pro™ (RFD). None of the officers chose the BVS MantaRay™ (FMD) or the REI Orion 2.4™ (NLJD) devices.

The report that follows presents T&E details and raises issues to consider when acquiring and implementing hand-held cell phone detection device technologies.

Chapter Review

Test and Evaluation of Hand-Held Cell Phone Detection Devices contains the following sections.

1. Introduction

This section highlights the purpose of the hand-held cell phone detection device T&E and why it is important to practitioners in the correction field.

2. Problem Statement

This section defines the problem and the need to conduct a comprehensive T&E of the various hand-held cell phone detection technologies so that corrections practitioners will be better informed when making technology purchasing decisions.

3. Goal

This section defines the goal as determining which hand-held cell phone detection device(s) (if any) effectively enable(s) correctional staff to locate contraband cell phones under regular and routine operations.

4. Methodology

This section describes the T&E methodology.

5. Overview of Evaluation Activities

This section provides an overview of evaluation activities, including training, baseline testing, operational testing (patrol and cell search scenarios) and test result analysis.

6. Key Performance Measures

This section highlights the Key Performance Measures (KPMs) defined as minimum design and performance criteria by the SMEs consulted.

7. Summary of Hand-Held Cell Phone Detection Devices Evaluated

This section provides a descriptive summary of the hand-held cell phone detection devices evaluated.

8. Vendor Training

This section describes the training provided by the vendors and summarizes evaluations completed by the participants.

9. Baseline Tests

This section summarizes the results of the completed baseline tests.

10. Operational Tests

This section summarizes the results of the operational tests (i.e., patrol and cell search scenarios).

11. Operational Evaluation

This section summarizes the operational evaluations conducted by corrections officers over a period of 60 days.

12. Limitations and Considerations for Future T&Es

This section summarizes the T&E limitations and presents recommendations for future T&E technology research.

13. Summary

This section summarizes the project and the results.

1. INTRODUCTION

The National Law Enforcement and Corrections Technology Center (NLECTC) Corrections Technology Center of Excellence (CX CoE) initiated a test and evaluation (T&E) of hand-held cell phone detection devices in an operational field test based on the recommendation of corrections practitioners who recognized the need for an objective, scientific evaluation of commercially available technologies. The CX CoE identified subject-matter experts (SMEs) who provided valuable input into the definition of key performance measures and operational test protocols.

Vendors interested in participating in this evaluation were asked to execute a letter of understanding that required them to loan their equipment to the CX CoE for a period not to exceed 90 days (see Appendix L, DOJ/NIJ Federal Register Notice). Participating vendors were provided with a draft copy of the Test and Evaluation Protocol prior to testing. Their input was considered in the development of the final Test and Evaluation Protocol. (See Appendixes A and B.) Vendors were also offered a copy of the final evaluation report that they can use to further improve their product(s).

2. PROBLEM STATEMENT

There are several technology solutions being marketed to corrections practitioners as hand-held cell phone detection devices. It should be noted that none of these devices are exclusively designed to be "cell phone detection devices" per se. Rather, they are devices that detect either the internal components of a cell phone (ferromagnetic detection, or FMD, and non-linear junction detection, or NLJD), or the operating radio frequency from a cell phone (radio frequency detection, or RFD). Many of the same components found in a cell phone are also found in authorized electronic devices (AEDs) that inmates are allowed to possess (e.g., MP3 players, televisions, radios, digital watches, etc.). Hand-held FMD and NLJD devices cannot distinguish between a contraband cell phone and an AED. RFD devices simply detect the radio frequency (RF) energy in the area. They cannot detect cell phones that are OFF.

For the purposes of this T&E, only an alert on a true alarm (i.e., a cell phone or cell phone accessories) was calculated in the true alarm rate (TAR). If the device alerted on an AED, it was recorded as a false alarm and calculated in the false alarm rate (FAR). An alert on an AED is simply an annoyance to a corrections officer conducting a cell search. It slows down the search process. Ideally, a true hand-held cell phone detection device would recognize the difference between a cell phone and an AED, and only alert on a cell phone. Current technologies cannot do that.

It is important to understand how the various technological solutions function. Each technology has its strengths and limitations (see Exhibit 5). A brief description of the technologies is provided in Section 2.1. Technology Background. Understanding how the various technologies work will help corrections practitioners make better informed operational policy and technology purchasing decisions.

Again, readers are cautioned against making direct comparisons between dissimilar technologies. The selected technology solution must be based on a solid concept of operations. Best practices suggest that it is best to deploy a multi-layered approach to security, utilizing different technologies and cell phone interdiction strategies.

2.1 Technology Background

2.1.1 Ferromagnetic Detection (FMD) – BVS MantaRay™. The MantaRay™ employs sensitive ferromagnetic detectors arranged in a tri-axis. It does not radiate any energy of its own (unlike a NLJD device) to excite the circuits of a cell phone in the OFF mode. Therefore, this FMD device is not subject to Federal Communications Commission (FCC) oversight. A cell phone's ferromagnetic components are what allow the MantaRay to discover phones within range of the sensor head.

Manta Ray constantly takes measurements based on minute changes in its orientation to ferromagnetic objects and the earth's electromagnetic energy field. The LCD screen indicates slight variations in detected objects by displaying a bar graph. A positive indication of a ferromagnetic object is displayed as crosshairs in the display, blue LEDs (which blink on only during

detection) and an audible beep. A "wiping" technique (up-down or side-to-side) is used to scan over the surface of an area suspected of concealing a cell phone.

The BVS product literature provides the following notice to users regarding this wiping technique:

> MantaRay™ is a very sensitive instrument. Some metallic objects other than phones may trigger the MantaRay™ though most metal should not trigger false detections. You will notice that waving it very quickly in the air will produce false triggers and not waving it at all will produce no triggers (even if there is a cell phone inches away from it). This is because MantaRay™ is constantly taking measurements based on minute changes in its orientation to ferromagnetic objects and the earth's electromagnetic energy field. (See MantaRay™ Quick Start User's Guide, Appendix G, p. 2.)

Although the MantaRay product literature indicates that the device can be used in both hand-held mode and stationary mode, its ultra-sensitivity to movement results in a relatively high FAR when used in hand-held mode. The BVS representative advised during the training session that the device is best used and most reliable in the stationary mode (see Section 9.1.). The stationary mode was not consistent with the T&E protocol or with the PA DOC's standard cell search procedures, so the device was not tested in this manner.

2.1.2 Non-Linear Junction Detection (NLJD) – REI Orion 2.4™. The Orion 2.4™ NLJD is a physical search tool that provides a detection alert on electronic components regardless of whether or not the electronic target is powered up or turned on. The Orion 2.4™ will respond to a cell phone (even with the battery removed), the cell phone charger, a SIM card or any other electronic contraband when the head of the device is placed in close proximity of the suspect target search area (note that detection will vary depending on size of the electronics and shielding). The Orion 2.4™ takes advantage of a unique property of electronic semiconductor components: when semiconductors are radiated with RF energy from another device (e.g., the Orion 2.4™), the target semiconductors will re-radiate RF energy at a harmonic frequency of two and three times the original transmit frequency. The Orion 2.4™ transmits a signal at 2.4 GHz, then indicates any corresponding received RF energy at 4.8 GHz (second harmonic, shown in red on the display screen) and 7.2 GHz (third harmonic, shown in yellow on the display).

It is important for the user to differentiate between the second and third harmonic responses to determine if the response is from an electronic target or from some other naturally forming non-linear junction (e.g., rust, corrosion, dissimilar metals). If the second harmonic (4.8 GHz, shown in red on the Orion 2.4™ display) response is stronger, this indicates the presence of electronics. If the third harmonic (7.2 GHz, shown in yellow on the Orion 2.4™ display) is stronger, this indicates the presence of naturally forming non-linear junctions that are likely not electronic. REI provides training on discriminating between these two types of responses.

The Orion 2.4™ is FCC compliant (see Appendix K).

2.1.3 Radio Frequency Detection (RFD) – BVS PocketHound™ and Wolfhound-Pro™. The PocketHound™ cell phone detector uses a narrowband/high-selectivity RF receiver controlled by an on-board processor. The PocketHound™ receiver has a resolution bandwidth of 4 MHz and uses a square-law detector. The receiver can be set to scan multiple up-link frequency bands. These bands are used by all cell phones (up to 4G technology) in communication with local cell towers. It is these signals from cell phone mobile handsets that allow them to be detected by RF receivers. Cell phone RF signals in standby, text, voice or Internet active modes will be detected if within range of the PocketHound™; however, due to the short duration of the signal, the PocketHound™ will be unable to hone in on the source. The PocketHound's™ antenna is built into the device as a flat patch antenna (180 degrees coverage to the front) just behind the glossy front label. Location of a cell phone in the ON/Active mode is possible using the display LEDs and proximity method.

The RF receiver detector output is used to drive the following indicators:

- PocketHound™ will vibrate when it detects a cell phone.
- PocketHound™ will display up to four blue LEDs when it detects a cell phone. The number corresponds to the signal strength detected. More lit LEDs indicate a stronger signal and closer proximity to the target phone.

Wolfhound Pro™. According to BVS, the Wolfhound Pro™ cell phone detector uses a narrowband/high-

selectivity RF receiver controlled by an onboard processor. The receiver has a resolution bandwidth of 4 MHz and uses a square-law detector. The receiver can be set to scan multiple up-link frequency bands. These bands are used by all cell phones (up to 4G technology) in communication with local cell towers. It is these signals from the cell phone mobile handsets that allow them to be detected by RF receivers.

BVS claims that the Wolfhound Pro's™ antenna is directional and allows the user to obtain a vector on a phone in standby, text or Internet mode (see Appendix I). As the user approaches the target phone, the Wolfhound Pro™ displays, sounds, flashes and vibrates to indicate closer proximity and ultimate interception to the target phone. An omni-directional antenna is also supplied for use when monitoring a large area for just the presence and strength of cell phone activity. This T&E only tested the direction finding (DF) antenna.

The RF receiver detector output is used to drive one or more of the following indicators:

- Height of coarse and fine bar charts in the OLED display.
- Pulsing rate of laser.
- Pulsing rate of sound alert (speaker or ear bud).
- Turning on vibrator alert (fixed rate).

2.2 Federal Communications Commission and Commercially Available Devices. Since NLJD detectors transmit radio waves during operation, the FCC governs the use of these devices. Operation is limited to approved NLJD equipment only. REI provided documentation that the NLJD device tested during this T&E (the REI Orion 2.4™) is FCC- compliant if used as specified (see Appendix K). At present, it is the only known NLJD device marketed in the United States that has received compliance documentation from the FCC.

It is likely that there are some foreign-made NLJD devices marketed domestically that have not received documentation of FCC compliance (see section 4.2. Hand-Held Cell Phone Detection Device Selection and Vendor Input re: Audiotel International, Ltd.'s SB Detector™; and Selcom Security's, Lornet-24™ and Lornet-36™ devices being marketed by Cellution Technologies, Ltd.). FCC compliance (where required) was a requirement of this solicitation. Practitioners interested in purchasing NLJD equipment would be well-advised to ensure that NLJD devices have been tested and are in compliance with appropriate FCC regulations.

The other hand-held cell phone detection devices tested during this T&E are not subject to FCC oversight. The BVS MantaRay™ FMD and the two RFD devices (BVS PocketHound™ and BVS WolfHound Pro™) do not emit or interfere with radio waves.

2.3 Disclaimers. The following disclaimers are presented below:

2.3.1. Opinions, Findings and Conclusions or Recommendations. This project was supported by Award No. 2010-IJ-CX-K003, awarded by the U.S. Department of Justice (DOJ), Office of Justice Programs, National Institute of Justice (NIJ). The opinions, findings and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect those of DOJ.

2.3.2. Endorsement. Commercial products included herein do not constitute an endorsement by NIJ, DOJ, NLECTC or the CX CoE. NIJ, DOJ, NLECTC and the CX CoE assume no liability for any use of publication content. This publication is a reference for educational purposes only. Please carefully consider the particular needs/requirements of your agency and any applicable laws before developing policies or procedures governing the use of any technology.

2.3.3. Legal Issues. All legal aspects regarding expectation of privacy issues, probable cause, warrants and any other operational law enforcement procedures should be researched by agencies and their officers in accordance with local, state and federal laws prior to the implementation of technology described herein.

2.3.4. FCC Compliance. Organizations and individuals should ensure that NLJD devices have been tested and are certified to be in compliance with appropriate FCC regulations before they are operationally deployed. These devices are subject to FCC regulations under Title 47, Part 15 of the Code of Federal Regulations (CFR). See: http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title47/47tab_02.tpl

3. GOAL

The goal of this evaluation is to determine which hand-held cell phone detection device(s) (if any) effectively enable(s) correctional staff to locate contraband cell phones under regular and routine operations.

4. METHODOLOGY

4.1 Subject Matter Expert (SME) Input and Site Selection. The CX CoE assembled a group of subject-matter experts (SMEs) from the Institutional Corrections Technology Working Group (TWG) and the Sensors, Surveillance, and Biometrics TWG to provide input into the T&E plan. The protocol began with the aforementioned goal of evaluating which hand-held cell phone detection device(s) (if any) effectively enable(s) correctional staff to locate contraband cell phones under regular and routine operations. The SMEs and practitioners established the Key Performance Measures (KPMs; see Section 6) that establish the design and performance metrics that are meaningful to corrections practitioners. This group of experts made it clear from the onset that the test protocol must be designed to evaluate the hand-held cell phone detection devices in an operating corrections environment. They wanted to know: Does this technology work? Can these devices find cell phones? Does the technology help or hinder the corrections officer using the device?

The CoE reached out to John E. Wetzel, secretary of the Pennsylvania Department of Corrections (PA DOC) to request that the PA DOC host the proposed T&E at one of their facilities. Secretary Wetzel selected the State Correctional Institution at Chester (SCI-Chester) in southeastern Pennsylvania as the T&E site. SCI-Chester is a medium security (level 3) adult male correctional facility located in an urban industrial area near Philadelphia. It is adjacent to a popular casino and racetrack (see Exhibit 6).

Exhibit 6. Google™ earth View of SCI-Chester Adjacent to a Casino and Racetrack

Source: Google™ earth (2014).

SCI-Chester was expected to be a challenging T&E environment (particularly for the RFD devices) due to its urban industrial location and its adjacency to a 24/7 casino and racetrack. It is also adjacent to a high-volume automobile route and a bus stop with numerous cell phone users. There was concern about potential RF interference from these external sources. Fortunately, this was not a problem. The inmate housing units where the operational tests took place were far enough inside the facility and sufficiently shielded by concrete and steel so that no outside RF interference was observed during the T&E.

The corrections officers who participated in the evaluation were selected because they are members of the SCI-Chester Search Teams. The Search Teams conduct routine and targeted searches of inmate cells and common areas within the facility. They are the target market and the end-users of this technology because it is their function to find contraband. They are trained and experienced in finding contraband (including cell phones) and familiar with the ways that inmates conceal contraband in their cells. The Search Team officers had input into the development of the test scripts and protocol to ensure that they realistically simulated (to the extent possible) how an inmate would conceal a cell phone and how an officer would use a hand-held cell phone detection device to find it.

4.2 Hand-Held Cell Phone Detection Device Selection and Vendor Input. Interested vendors were asked to supply hand-held cell phone detection devices for evaluation (see the Federal Register Notice (FRN) at Appendix M). Equipment submitted for T&E had to meet the following specifications:

- Weigh less than 8 pounds.
- Be battery operated with a minimum run time of two hours.
- Be designed for single person operation.
- Operate using RFD and/or NLJD technology.

The BVS MantaRay™ device does not employ either RFD or NLJD technology. Initially, BVS indicated that the MantaRay™ device is a "Component Detector" (see Appendix Q, Specific Product Information). Later, they specified that it is an FMD device. The decision was made to include the FMD device in the T&E, along with the RFD and NLJD devices, since it met the other hand-held device specifications and FMD technology provided a third solution to evaluate. The inclusion of all available hand-held cell phone detection device solutions and technologies makes the T&E more robust.

The CX CoE required that all supplied hand-held cell phone detection devices had to be compliant with all relevant FCC regulations and had to be in production and commercially available to the practitioner community.

Two potential vendors withdrew their request to participate in the T&E. One vendor (Audiotel International, Ltd.) originally intended to submit their SB Detector™ (NLJD) for the T&E (see Appendix R); but could not secure FCC approval of the device in time to participate (see http://www.audiotel-international.com/products/sb-detector1/). Note: Audiotel has still not received FCC approval for their NLJD device (per an email dated Sept. 22, 2014).

A second vendor (Cellution Technologies, Ltd.) originally intended to submit the Selcom Security Lornet-24™ and Lornet-36™ NLJD devices for the T&E (see Appendix R), but later advised the CoE (via telephone call) that Selcom made a business decision to **not** pursue FCC approval of the device due to the cost of compliance testing (see http://cellutiontech.com and http://www.selcomsecurity.com/en/products/data-leakage-channels-detection/itemlist/category/51-non-linear-junction-detectors). Note: Selcom Security reaffirmed that the company has made a business decision to **not** seek FCC approval for either NLJD device (per an email dated Nov. 3, 2014.)

Vendors received an opportunity to comment on the draft T&E Protocol and test scripts. Their comments were taken into consideration (see Vendor Questions re: T&E Protocol and CoE Responses at Exhibit 7.) Note: Specific references may not be current due to subsequent editing of the protocol. These questions and responses were specific to an early draft. Page and item numbers may have changed.

Probably the most significant concern from the vendor perspective was with how the test protocol defined TAR and FAR for AEDs. The vendors contend that an alert on an AED should be recorded as a TAR, because the device found an electronic target. The protocol, however, records alerts on AEDs as a FAR, because to a corrections officer searching a cell, a hand-held cell phone detection device that alerts on numerous AEDs is a nuisance that slows down the search process. From the user's perspective, it is only a TAR if the device correctly alerts on a cell phone or a cell phone accessory (e.g., a SIM card or charger).

4.3 Research Design and Analysis. The research design for this T&E consisted of Baseline Testing, Operational Patrol Scenario Tests, Operational Cell Search Scenario Tests, a 60-day Operational Evaluation conducted by the SCI-Chester Search Team officers and data analysis. Each phase of the T&E research design is presented in more detail below.

4.3.1 Baseline Testing. The Baseline Testing (see Section 9. Baseline Tests, Appendix A and Appendix C) was designed to measure the effectiveness of each device in

Exhibit 7. Vendor Questions re:T&E Protocol and CoE Responses

Vendor Question	CoE Response
In order to come as close as possible to a true voice call, BVS has encouraged the use of a white noise generator device acoustically coupled to the microphone of the target phone during testing for detection and location. This method keeps the phone's RF carrier modulated at some power level above idle, which is more representative of an actual voice call. The phone's stronger signal transmitted using this technique facilitates the detection and location of the target phone. I understand that you do not want to give away the location of the target phone by an audio cue such as the rushing sound of white noise. Maybe there can be a compromise in the design of the test. Close acoustical coupling yields minimal detected sound from a jail cell whose door is shut.	The concern is noted. A phone with a constant, active, strong power modulation will likely be easier to detect than one in idle mode. The proposed white noise generator device would simulate an inmate in his cell actively engaged in a voice call. The protocol is designed to detect voice communications while also detecting idle phones. A white noise generator will not be used. The hand-held detection devices will be subjected to the test script outlined in the Hand-Held Device TE Protocol document. Results will be recorded. If necessary, the test script can be modified subsequent to the initial tests. It should be noted that the CoE reserves the right, *"due to programmatic, logistical, operational or technical factors, to change any or all tests, protocols, variables and/or methods without notice. The protocol detailed herein is for informational, reference and guidance purposes."* (See *Hand-Held Cell Phone T&E Protocol,* Appendixes A, p. 5 and B, p. 7.)
Vendor Question	**CoE Response**
BVS' cell phone detectors are 4G compatible but I did not see any LTE modulated test scenarios with the target phones. Most of these LTE services from Verizon and AT&T are in the 700 MHz frequency band. Consider adding 4G LTE to the T&E protocol.	The test script cannot cover all possible carriers, phone types and communication frequencies. These protocols do provide a baseline foundation of test targets. The CoE decided not to add a 4G LTE phone to the test protocol document. If necessary, the test script can be modified subsequent to the initial tests. It should be noted that the CoE reserves the right, *"due to programmatic, logistical, operational or technical factors, to change any or all tests, protocols, variable, and/or methods without notice. The protocol detailed herein is for informational, reference and guidance purposes."* (See *Hand-Held Cell Phone T&E Protocol,* Appendixes A, p. 5 and B, p. 7.)
Vendor Question	**CoE Response**
BVS MantaRay™ is a ferro-magnetic detector. Some of your T&E protocol requires the device to be used in a cell search. My experience with the MantaRay™ has yielded mixed results when using it to scan surfaces inside the jail cell. The quantity of ferrous metal in the jail cell tends to "distribute" the magnetic signature of the cell phone thus making it difficult to locate the phone. Improvements are realized when the suspected vessels or items can be removed to an area outside the jail cell and into an open space. For example, a mattress scan while the mattress is still on the bunk frame will yield poor results due to the proximity of the metal frame, tray, etc. When this mattress is removed from the jail cell and taken into an open area, your chances of a successful detection with the MantaRay™ are greatly improved. Were you going to bury cell phones inside of mattress pads?	The protocol is designed to simulate a corrections officer conducting a routine search of a cell. The Concept of Operations (ConOps) is a corrections officer conducting a cell search should be able to complete that search more efficiently through the use of hand-held detection technology over a traditional hands-on search. The cell searches will be conducted in accordance with the policies and procedures established by the Pennsylvania Department of Corrections (PA DOC). The test script models the PA DOC's procedure for a routine cell search. The procedure does not require the officer to remove anything from the cell. Mattress pads were considered as a test vessel; however, due to time and budget constraints, the number of potential concealment vessels and test permutations had to be limited. It is expected that the cardboard box vessel will effectively simulate concealed targets and should provide a result similar to a target concealed in a mattress pad. If necessary, the test script can be modified subsequent to the initial tests. It should be noted that the CoE reserves the right, *"due to programmatic, logistical, operational or technical factors, to change any or all tests, protocols, variable, and/or methods without notice. The protocol detailed herein is for informational, reference and guidance purposes."* (See *Hand-Held Cell Phone T&E Protocol,* Appendixes A, p. 5 and B, p. 7.)

Vendor Question	CoE Response
On page 10, item 5 under "Test Procedures," we are not clear by what you mean by "dummy" aluminum foil, and we are confused by your use of an empty plastic phone shell as a target in aluminum foil and peanut butter. Can you explain? Is this meant to be a real target or a false target that should not be located by detection devices? A plastic shell with no electronics (containing no non-linear junctions) would not be detected by any NLJD.	The intent of wrapping an empty plastic cell phone case with aluminum foil is to simulate the concealment of contraband (other than an electronic device) in a foil shield of similar shape and size as a cell phone. It is assumed that neither an NLJD device nor an RFD device will detect this target. The test will confirm and document this assumption and observe whether there is any other technology that might detect the aluminum foil target. To avoid confusion, the term "dummy" has been deleted.
Vendor Question	**CoE Response**
As any NLJD uses RF energy (transmitted from the NLJD) to detect the presence of electronic components, we presume that if the target containing electronics (e.g., cell phone, charger or other electronic contraband) is wrapped in aluminum foil shielding the target from RF energy, that it would be difficult to detect with any NLJD. We also hope that you would not publish information on how to shield electronic contraband from NLJD detection (correctional facilities using NLJD technology would not want inmates to have this information).	The intent of wrapping cell phone components with aluminum foil is to simulate the concealment of contraband cell phone accessories and to evaluate the capability of the various technologies to detect items concealed in this manner. It is assumed that neither an NLJD device nor an RFD device will detect these targets. The tests will confirm and document this assumption and observe whether there is any other technology that might detect contraband concealed in aluminum foil. The CoE acknowledges the sensitivity of publishing information that may serve as a "How-To Guide" for the advancement of criminal activity. NIJ will determine how to classify the final report (e.g., For Official Use Only – Law Enforcement Sensitive) and whether or not the final report will be published. Manufacturers who submit their equipment for testing expressly acknowledge that they may not publish, or otherwise disseminate, the final report (including all work products) without the express written consent of NIJ.
Vendor Question	**CoE Response**
With regard to AEDs, the ORION 2.4™ is designed to detect any electronic components which are not completely shielded. We presume that electronic devices that are "Authorized" may vary from one prison to another (some allow radios and mp3 players, and some do not). The point being that we do not consider detection of an AED a "false alarm" (FAR) detection or a "nuisance alarm" (NAR) detection; the ORION 2.4™ does not know what electronics may or may not be authorized at a particular facility, and the proper operation of the ORION 2.4™ would detect and locate any electronics and it is then up to the operator to determine if it is authorized or contraband based on that facilities specific rules and regulations.	The concerns are noted and the limitations of the current technologies are understood. The tests will confirm and document the current state and observe whether there is any other technology that might have the capability to differentiate AEDs from contraband cell phones. However, the goal of this evaluation is "to determine which hand-held cell phone detection device(s) (if any) effectively enable(s) correctional staff to locate contraband cell phones under regular and routine operations." (See Hand-Held Cell Phone T&E Protocol, p. 1.) As a result, any alarm that is not the result of cell phone detection will be considered a False Alarm from this operational perspective. Whenever possible, False Alarms will be designated as originating from either AEDs or Other Sources. Frequency and rates associated with False Alarms will be reported as such: FAR(AED), FAR(Other), FAR(Total).

an as-controlled environment as possible. The Baseline Testing occurred immediately after the training so that operation of the equipment was fresh in the officers' minds.

In theory, Baseline Tests should produce the best results for each device since there is no interference by cell structure or inmate property. Baseline Testing is, essentially, a tabletop exercise designed to allow each hand-held cell phone detection device to perform to its fullest potential in an environment that controls, as much as practicable, for external influences and other variables.

Each test target was concealed in various configurations (OFF, ON/Passive (standby) and ON/Active modes) in multiple concealment vessels (cardboard box, concrete block, peanut butter jar, wrapped in aluminum foil). Each of the four hand-held cell phone detection devices was used to attempt to locate each target in each vessel. Null tests were conducted against empty vessels.

The results were duly recorded on forms titled Cell Phone Detection Device T&E Worksheet – Baseline Tests (see Appendix N). These forms noted the test number (which corresponds with the Baseline Test Protocols: see Appendix A), the tester's name, the date, any notable device settings, the range of detection (feet/inches), whether there was a true alarm (i.e., the device alerted on an actual cell phone or cell phone

accessory) or a false alarm (i.e., the device alerted on anything other than an actual cell phone or cell phone accessory), and, for phones in ON/Passive mode only, whether the device provided a power-up true alarm. The power-up true alarm was designed to verify that the device could detect the initial "handshake" RF signal with the cell phone tower when a cell phone is first activated.

The results of the Baseline Tests are presented in section 9.

4.3.2 Operational Patrol Scenario Tests. Once the Baseline Tests were completed and the results recorded, the research design called for realistic Operational Patrol Scenario Testing (see section 10.1. and Appendixes B and D). These tests were conducted in functioning inmate housing units (cell blocks) during peak operational periods, with a considerable amount of inmate activity and movement.

The Baseline Testing established what the vendors had already stipulated regarding the Patrol Scenario Test Protocol (i.e., FMD and NLJD devices are not designed to detect contraband cell phones from the operationally defined standoff distance of 10 feet). The standoff distance of 10 feet was established as an approximation of the distance from the rear of a typical inmate cell to the floor or tier from which a patrolling corrections officer would search for RF signals with the hand-held detection device. The device would have to be capable of detecting the contraband cell phone through reinforced concrete walls and steel cell doors. Clearly, the FMD and NLJD devices could not perform under this scenario and they were excluded from Patrol Scenario Testing.

The two RFD devices demonstrated their ability to detect cell phones at greater than 10 feet during the Baseline Testing, so they were subjected to Patrol Scenario Testing. The research design premise behind the Patrol Scenario Testing was to evaluate whether or not a corrections officer could correctly identify the source of a cell phone's RF signal with sufficient accuracy to enable the officer to locate and recover the target cell phone while conducting routine foot patrol rounds.

The Patrol Scenario Test Protocol did not attempt to search for contraband cell phones in the OFF position since the Baseline Testing established what the vendors had already stipulated regarding the Patrol Scenario Test Protocol (that is, RFD devices are not designed to detect cell phones that are turned OFF. Since the SMEs determined that inmates do not generally conceal phones in the ON/Active or ON/Passive modes in peanut butter jars or wrapped in aluminum foil, these concealment vessels were eliminated from Patrol Scenario Testing. The concrete block vessel was also eliminated due to the naturally present concrete in the cell block environment.

No AEDs or cell phone accessories were planted in inmate cells. The target cell phones were placed in cardboard boxes in the inmate cells. The set of 18 tests was repeated for a total of 36 tests (see section 10.1, Appendixes B and D).

For control purposes, the officers conducting the patrol rounds with the devices were not told where the target cell phones were located. They remained outside of the inmate housing unit while one of their peers concealed the target phones in inmate cells. Once the cell phones were concealed, the searching officers entered the inmate housing unit to commence the search. The search times were recorded from the moment the officer entered the housing unit with the hand-held detection device until he found the target cell phone (see Appendix O Cell Phone Detection Device T&E Worksheet – Patrol Scenario Tests).

4.3.3 Operational Cell Search Scenario Tests. The Cell Search Scenario Tests were designed to evaluate whether or not any of the hand-held cell phone detection devices could assist a corrections officer in finding a contraband cell phone while conducting a cell search (see section 10.2 and Appendixes B and E). All four hand-held cell phone detection devices were subjected to the Cell Search Scenario Tests.

Since the SMEs determined that inmates don't generally conceal cell phones that are ON in aluminum foil or peanut butter, these target/vessel configurations were not used during Cell Search Scenario Testing. The cell wall construction served as a natural concrete vessel, so there was no need to conceal any targets in concrete blocks during the Cell Search Scenario Testing. This type of testing was limited to the cardboard, peanut butter jar and aluminum foil vessels. No AEDs were planted in cells. It was determined that there are a sufficient number of organic AEDs in inmate cells (e.g., televisions/remote controls, radios, digital watches) so it was not necessary to plant any additional AEDs. Since the Baseline Testing demonstrated that RFD devices cannot detect a cell phone unless it is in ON/Active or

ON/Passive (standby) mode, the two RFD devices (the PocketHound™ and the WolfHound Pro™) were not tested against cell phone targets in the OFF mode.

For control purposes, the officers conducting the Cell Search Scenario Tests with the devices were told which cells to search, but they were not told where in the cells the target cell phones were hidden. They remained outside of the inmate housing unit while one of their peers concealed the target phones. Once the cell phones were concealed, the searching officers entered the inmate housing unit to commence the search. The search times were recorded from the moment the officer entered the assigned cell with the hand-held detection device until he found the target cell phone (see Appendix P Cell Phone Detection Device T&E Worksheet – Cell Search Scenario Tests).

4.3.4 60-Day Operational Evaluation. Once the data from the Baseline and Operational Testing was recorded, the four hand-held cell phone detection devices were left onsite for the search teams to use and evaluate. The corrections officers conducted operational evaluations over a period of 60 days. They were directed to use all four hand-held cell phone detection devices during the course of their daily duties and were allowed to use their own discretion as to which devices they wanted to use on any given day.

The Search Team members were asked to consider the following questions, performance metrics and subjective evaluation criteria while using the hand-held cell phone detection devices:

- Amount of time spent using each device.
- Rank the durability of each device using a 5-point Likert Scale (1=Poor to 5=Excellent), considering how you think the device will hold up to daily use in the corrections environment.
- Rank the user interface display of each device using a 5-point Likert Scale (1=Poor to 5=Excellent) considering how easy (or difficult) it is to interpret the alerts/displays that each device produces.
- Rank the ergonomics of each device using a 5-point Likert Scale (1=Poor to 5=Excellent), considering size, weight and user comfort level.
- Identify what features you like about each device, considering durability, ergonomics, user interface, TAR, battery life, cost and other.
- Identify what features you do not like about each device, considering durability, ergonomics, user interface, TAR, battery life, cost and other.
- Provide an overall rating for each device using a 5-point Likert Scale (1=Poor to 5=Excellent), considering durability, ergonomics, user interface, TAR, battery life, cost and other.
- Identify which device you would prefer to use to locate cell phones that are ON?
- Identify which device you would prefer to use to locate cell phones that are OFF?
- The survey respondents were given the following Operational Scenario: *Assume that you receive credible intelligence from a reliable informant that there is a contraband cell phone in a specific inmate housing unit, but you don't know which inmate has it. You don't know whether the cell phone is currently ON or OFF. You have access to all four hand-held cell phone detection devices (MantaRay™, PocketHound™, WolfHound Pro™ and the Orion 2.4™). Which detection device (or combination of detection devices), would you choose to help you find the contraband cell phone?*
- The corrections officers were also asked the question: *Assume that you have been given permission to purchase any of the four hand-held cell phone detection devices. Which device (or devices) would you buy and why?*
- In an effort to further narrow down the device of choice, the corrections officers were asked to: *Assume that you have been given permission to purchase only **one** of the four hand-held cell phone detection devices. Which **ONE** device would you buy and why?*
- The corrections officers were asked if there is anything that could be done to improve the technology that would help them do their job more efficiently. They were asked, specifically, what features they would like to see in the ideal hand-held cell phone detection device.

The results of the survey are presented in Section 11. It is acknowledged that there are significant limitations to

this survey. There were only six (n=6) survey respondents. They used the hand-held cell phone detection devices for a limited period of 60 days before taking the survey. Obviously, the results are based on the subjective evaluation of a small number of people. It is noted, however, that the survey responses very closely mirror the objective Baseline and Operational Test experience with the equipment.

Clearly, there are limitations to conducting field research in the operational environment of a functioning state correctional facility with a limited amount of devices, concealment vessels, personnel and time/resource constraints. Those limitations are acknowledged and more fully explored in Section 12. Limitations and Considerations for Future T&Es.

4.3.5 Data Variables and Analysis. The intent of the T&E was to evaluate the ability of hand-held cell phone detection devices to locate contraband cell phones in a real-world correctional environment. To that end, the SMEs selected the four concealment vessels (cardboard box, concrete block, peanut butter jar, aluminum foil) as representative natural environmental barriers that would likely account for the composition of materials readily available to an inmate in his cell. These vessels also reflect the experience of the SME practitioners who are familiar with how inmates conceal their contraband.

Clearly, the above-referenced list of concealment vessels is not all-inclusive. Certainly there are other ways and means that inmates can, and do, hide contraband. Given the time and resource constraints, it was simply impractical to test against every possible concealment vessel. Tests against additional concealment vessels would add to the body of knowledge and make future T&Es even more robust. For more discussion on this topic, please refer to Section 12. Limitations and Considerations for Future T&Es.

In the Baseline Tests, each of the four hand-held cell phone detection devices was tested against cell phones that were in the ON/Active, ON/Passive and OFF modes. The devices were also tested against AEDs, cell phone accessories and empty (null) targets. The data variables that were collected are illustrated by Exhibit 8. Data Variables by Concealment Vessel. See the Assumptions and Notes under the data table for an understanding of how the variables were coded.

In addition to the Range of Detection, the TAR and FAR data collected for each hand-held cell phone detection device during Baseline Testing, Operational Tests (Patrol Scenario and Cell Search Scenario Tests) were used to evaluate how the devices performed during field testing. The Operational Test field data is remarkably similar to the Baseline Test data, which validates the findings of both tests (see Section 9. Baseline Tests and Section 10. Operational Tests).

The subjective, qualitative survey completed by six of the search team officers at the conclusion of the 60-day Operational Evaluation period further supported the quantitative findings (see section 4.3.4). This data is presented, in most cases, as the percentage of respondents who selected fixed choice questions (using a 5-point Likert Scale, 1=Poor to 5=Excellent), about their individual preferences for each device, both individually and in comparison to the other devices tested (see Section 11. Operational Evaluation). The questions covered the users' opinions about durability, device interface, ergonomics and overall rating. When evaluators elected to make individual comments, those comments are reported. (Note: The opinions expressed are solely those of the individual respondent, whose anonymity was made a condition of participating in the survey. Neither DOJ, NIJ, NLECTC nor the CX CoE assumes liability for any use of survey results. These results are presented as a reference for educational purposes only.) (Also see Section 2.3. Disclaimers).

Other comparative KPMs and specification metrics such as device weight (ounces), battery run time (hours/minutes) and battery re-charge time (hours/minutes) were collected and are reported in section 6. See Exhibit 9. Key Performance Measures Comparison Matrix.

The next section provides an overview of the evaluation activities.

Exhibit 8. Data Variables by Concealment Vessel

Vessel[2]	Average[1] Range of Detection (inches)	TAR All (%)	FAR All (%)	TAR ON/Active (%)	FAR ON/Active (%)	TAR ON/ Passive (%)	FAR[4] ON/ Passive (%)	TAR[3] OFF (%)	FAR[4] OFF (%)	FAR[5] Empty (%)
Cardboard	–	–	–	–	–	–	–	–	–	–
Concrete	–	–	–	–	–	–	–	–	–	–
Peanut Butter Jar	–	–	–	–	–	–	–	–	–	–
Aluminum Foil	–	–	–	–	–	–	–	–	–	–
Overall[1]	–	–	–	–	–	–	–	–	–	–

Assumptions and Notes:

1. Average Range of Detection (in inches) is rounded and recorded at the minimum range. This is the distance that the operator first recorded an alert from outside of the concealment vessel. The target cell phones were some distance farther inside the various vessels. Average distances were applied to the various vessels to account for the extra distance that the target cell phones were away from the hand-held detection device when the alerts were first recorded. The Range of Detection is reported as a range (low-high). The following average distances were applied to establish the Range of Detection:

    a. Cardboard - +6 in.

    b. Concrete - +2 in.

    c. Peanut Butter Jar - +1 in.

    d. Aluminum Foil – 0 in.

    e. OVERALL Average Range of Detection: 1- 2 in. +/-average thickness of the concealment vessel.

2. Some tests produced both False Alarms and True Alarms, depending on the vessels being scanned.

3. Alerts on Cell Phone Accessories were coded as TAR OFF.

4. Alerts on AEDs were coded as "FAR Passive" if ON, or "FAR Off" if OFF.

5. FAR Empty alerts are reported due to a notable FAR on benign targets.

5. OVERVIEW OF EVALUATION ACTIVITIES

Participating vendors were required to provide training onsite at no cost to approximately 15 to 20 persons, consistent with the level of training that they would normally provide to any new customer on equipment delivery. REI provided a half-day of training on the Orion 2.4™ NLJD device on Feb. 26, 2014. BVS provided a full day of training on three devices (MantaRay™, PocketHound™, and WolfHound Pro™) on February 28. Note that BVS does not normally provide free training with the purchase of their equipment. BVS training is optional and priced at $1,500/day, plus expenses. Section 8. Vendor Training presents an overview of the training provided and a summary of the evaluation forms completed post-training.

Baseline Tests (see Appendixes A and C) took place onsite at SCI-Chester under the supervision of CX CoE Director Joe Russo and Project Manager John Shaffer on March 3-5, 2014. Section 9. Baseline Tests presents an overview and analysis of the Baseline Testing.

Operational Tests (see Appendixes B, C and D) took place onsite at SCI-Chester under the supervision of Russo and Shaffer on March 5-7, 2014. Section 10. Operational Tests presents an overview and analysis of the operational testing.

The analysis performed by CX CoE staff on Baseline and Operational Test data was compared to the KPMs (see Section 6). At the completion of the formal testing on March 7, 2014, the four hand-held cell phone detection devices were left at SCI-Chester in order to provide the Search Teams with opportunities to deploy the equipment over a 60-day period in practical operational applications. Participating correctional officers then completed operational evaluations to summarize the performance of the devices in day-to-day use. These results are summarized in Section 11. Operational Evaluation.

6. KEY PERFORMANCE MEASURES

The SMEs established KPMs for all four hand-held cell phone detection devices. The KPMs were originally designed to facilitate the side-by-side evaluation of each device based on comparable performance metrics. It soon became apparent, however, that direct comparison of dissimilar technologies should be avoided. The RFD devices are designed to detect cell phones that are ON, while the FMD and the NLJD devices are designed to detect cell phones whether they are ON or OFF. While it may be appropriate to compare two RFD devices, or a FMD device to a NLJD device, it would not be appropriate to compare a RFD device to a FMD or a NLJD device. Readers should bear that in mind while reviewing Exhibit 9. Note that the data in Exhibit 9 represents averages; more specific details on each KPM can be found in the Operational Definitions and Notes below the table.

Whereas this summary of KPM data provides a quick snapshot comparison of the four hand-held cell phone detection devices, there is much more detail and depth to the T&E as noted below. The next section provides a descriptive summary and presents the detailed specifications for each device.

Exhibit 9. Key Performance Measures Comparison Matrix

Key Performance Measures	Manta Ray™ (FMD)	Pocket Hound™ (RFD)	Wolf Hound™ (RFD)	Orion 2.4™ (NLJD)
a. Range of Detection Average (inches/feet).	0-7 in.	78 ft.	86 ft.	0-8 in.
b. True Alarm Rate (TAR) Average (%).	49%	28%	44%	63%
c. False Alarm Rate (FAR) Average (%).	16%	0%	0%	16%
d. Device Weight (Oz.). *	10 oz.	8 oz.	30 oz.	45 oz.
e. Battery Run Time (Hours). *	~3 hrs.	~2-3 hrs.	~4-6 hrs.	~8 hrs.
f. Battery Re-Charge Time (Hours). *	~3 hrs.	~2-9 hrs.	~ 3-4hrs.	~ 2.5 hrs.
g. Durability Rating Average (1=Poor to 5 = Excellent).	2.3	4.2	3.8	2.2
h. Device Interface Rating Average (1 = Poor to 5 = Excellent).	2.8	4.0	4.0	2.7
i. Ergonomic Rating Average (1 = Poor to 5 = Excellent).	3.5	4.3	3.8	2.5
j. Overall Rating Average (1 = Poor to 5 = Excellent).	1.8	4.0	4.0	1.7

*Vendor-provided information. Not independently verified.

Operational Definitions and Notes:

a. Range of Detection – Distance that the device is able to detect a cell phone (inches/feet). See Section 9. Baseline Tests, Section 10. Operational Tests and Section 11. Operational Evaluation.

b. True Alarm Rate (TAR). See Section 9. Baseline Tests and Section 10. Operational Tests.

c. False Alarm Rate (FAR). See Section 9. Baseline Tests and Section 10. Operational Tests.

d. Device Weight (Lbs./Oz.). See Section 6. Key Performance Measures and Section 7. Summary of Hand-Held Cell Phone Detection Devices Evaluated.

e. Battery Run Time (hours/minutes). See Section 6. Key Performance Measures and Section 7. Summary of Hand-Held Cell Phone Detection Devices Evaluated.

f. Battery Re-Charge Time (hours/minutes). See Section 6. Key Performance Measures and Section 7. Summary of Hand-Held Cell Phone Detection Devices Evaluated.

g. Durability Rating Average by the evaluators on a subjective scale (1=Poor to 5=Excellent). See Section 11. Operational Evaluation.

h. Device Interface Rating Average by the evaluators on a subjective scale (1=Poor to 5=Excellent). See Section 11. Operational Evaluation.

i. Ergonomic Rating Average by the evaluators on a subjective scale (1=Poor to 5=Excellent). See Section 11. Operational Evaluation.

j. Overall Rating Average by the evaluators on a subjective scale (1=Poor to 5=Excellent). See Section 11. Operational Evaluation.

7. SUMMARY OF HAND-HELD CELL PHONE DETECTION DEVICES EVALUATED

A descriptive summary of each hand-held cell phone detection device evaluated is provided below.

7.1 Berkeley Varitronics Systems, Inc., MantaRay™

BVS
Liberty Corporate Park
255 Liberty St.
Metuchen, NJ 08840

Website:	http://www.bvsystems.com
Toll-Free US Phone:	(888) 737-4287
Outside US Phone:	+1 732-548-3737

Exhibit 10. Berkeley Varitronics Systems, Inc., MantaRay™

Source: BVS, 2014

BVS provided three hand-held cell phone detection devices for T&E. The first was the MantaRay ™ ferro-magnetic detection device. See Exhibit 10.

BVS provided the information and specifications about the MantaRay device listed in Exhibit 11. See also Appendix G – MantaRay™ Product Literature. Note that specifications and costs are subject to change; contact BVS for current information.

7.2 Berkeley Varitronics Systems, Inc., Pocket Hound™. The second hand-held cell phone detection device provided by BVS for T&E was the PocketHound™ RFD device. See Exhibit 12.

BVS provided the following information and specifications about the PocketHound™ device listed in Exhibit 15. See also Appendix H – PocketHound ™ Product Literature. Note that specifications and costs are subject to change; contact BVS for current information.

7.3 Berkeley Varitronics Systems, Inc., Wolf-Hound Pro™. The third hand-held cell phone detection device provided by BVS for T&E was the WolfHound Pro™ RFD device. See Exhibit 13 (shown with the direction-finding antenna).

BVS provided the information and specifications about the WolfHound Pro™ device listed in Exhibit 16. See also Appendix I – WolfHound Pro™ Product Literature. Note that specifications and costs are subject to change; contact BVS for current information.

Exhibit 11. MantaRay™ Product Information and Specifications

Manufacturer Name	Berkeley Varitronics Systems, Inc. (BVS)
Full Product Name	MantaRay™
Model Number	0086-MR
Software/Firmware Version (if applicable)	N/A
Technology (RF, NLJD, Other)	Other – Ferromagnetic Sensor
FCC Certification Required (Y/N)	No
Physical Description (to include photograph of device)	Hand-held unit with graphic LCD display. (See attached photographs and product specification sheet at Appendix G.)
Inmate Escape	Kan.
Dimensions (LxWxH)	7 in. x 3 in. x 2 in.
Weight (lbs./oz.)	10 oz.
Battery Use (Estimated Continuous Operating Time and Re-Charge Time)	~three hours
Battery Type	Standard Replaceable 9 V (2 Included); may use rechargeable 9 V (optional)
DC Power Option (Y/N)	Yes, in stationary mode
Vendor-Reported Detection Range (in./ft.)	~0-6 in. in hand-held mode; ~12 in. in stationary mode.
Detection Reporting (Graphical Map, Directional Arrow, Signal Strength, Ability to Detect Multiple Targets, etc.) (Narrative)	Bulls-Eye Color Graphic Display, Blue Light, and Audible Beep Indicator; No Directional Indication; and USB Port
Internal Log/Use Reporting (Y/N)	No
Passive vs. Active Operation (NOTE: RF = Passive; NLJD = Active)	Passive (Ferromagnetic)
Manufacturer's Warranty Period (Number of Months plus Extended Warranty Cost)	The MantaRay™ includes a one-year warranty against manufacturer's defects. If desired, BVS offers an additional one-year extended manufacturer's warranty for 8% of the purchase price (total of two years); or an additional two-year extended manufacturer's warranty for 12% of the purchase price (total of three years). This warranty covers any defects, but does not cover batteries, misuse or abuse. The customer is responsible for shipping both ways for any warranty claims (~3-5 day turnaround).
Manufacturer's Brochures, Sales Literature and/or Technical Data Sheets	See Appendix G
Manufacturer's Claims and Representations (Narrative)	BVS is quite open about the advantages and disadvantages of ferromagnetic sensing technology. The trainer was candid and responsive regarding the limitations of the MantaRay™ device.
Known Correctional Users, References and Contacts (List)	See Appendix F
Cost of Device and Accessories (Itemize)	$499 (plus shipping), includes two replaceable 9 V batteries. Volume discounts offered in multiples of 5-10-25-50-100 units (e.g., 20% discount for 25-49 units).
Other Comments (Narrative)	The MantaRay™ is designed to search people, not cells. The unit performs better in stationary mode after a 15-minute "warm-up" (calibration) period. The "warm-up" period is not required in hand-held mode. The device will not detect SIM/SD cards.

Exhibit 12. Berkeley Varitronics Systems, Inc., PocketHound™

Source: BVS, 2014

7.4 Research Electronics International (REI), Orion 2.4™

REI

455 Security Place

Cookeville, TN 38506

Website: http://www.research-electronics.com/

Toll-Free US Phone: (800) 824-3190

Outside US Phone: +1 931-537-6032

REI provided one hand-held cell phone detection device for T&E, the Orion 2.4™ non-linear junction detection (NLJD) device. See Exhibit 14.

REI provided the following information and specifications about the Orion 2.4™ device listed in Exhibit 17. See also Appendix J – Orion 2.4™ Product Literature. Note that specifications and costs are subject to change; contact REI for current information.

Exhibit 13. Berkeley Varitronics Systems, Inc., WolfHound Pro™

Source: BVS, 2014

Exhibit 14. Research Electronics International (REI), Orion 2.4™

Source: REI, 2014

Exhibit 15. PocketHound™ Product Information and Specifications

Manufacturer Name	Berkeley Varitronics Systems, Inc. (BVS)
Full Product Name	PocketHound™
Model Number	0060-PH
Software/Firmware Version (if applicable)	N/A
Technology (RF, NLJD, Other)	RF
FCC Certification Required (Y/N)	No
Physical Description (to include photograph of device)	Hand-held unit with LED light display. See attached photographs and product specification sheet at Appendix H.
Dimensions (LxWxH)	4.25 in. x 2.75 in. x 0.8 in.
Weight (lbs./oz.)	8 oz.
Battery Use (Estimated Continuous Operating Time and Re-Charge Time)	~Two to three hours of continuous use; ~two hours to recharge in the ON mode or ~nine hours to re-charge in the OFF mode (i.e., trickle charge).
Battery Type	Rechargeable internal lithium polymer; ~2-3 year battery life.
DC Power Option (Y/N)	No
Vendor-Reported Detection Range (in./ft.)	~75' (indoors).
Detection Reporting (Graphical Map, Directional Arrow, Signal Strength, Ability to Detect Multiple Targets, etc.) (Narrative)	LED light display with signal strength indicator; limited directional indication
	No
Internal Log/Use Reporting (Y/N)	No
Passive vs. Active Operation (NOTE: RF = Passive; NLJD = Active)	Passive (RF)
Manufacturer's Warranty Period (Number of Months plus Extended Warranty Cost)	The PocketHound™ includes a one-year warranty against manufacturer's defects. If desired, BVS offers an additional one-year extended manufacturer's warranty for 8% of the purchase price (total of two years); or an additional two-year extended manufacturer's warranty for 12% of the purchase price (total of three years). This warranty covers any defects, but does not cover batteries, misuse or abuse. The customer is responsible for shipping both ways for any warranty claims (~three to five day turnaround). Firmware updates are provided free of charge.
Manufacturer's Brochures, Sales Literature and/or Technical Data Sheets	See Appendix H
Manufacturer's Claims and Representations (Narrative)	BVS is quite open about the advantages and disadvantages of RF sensing technology. The trainer was candid and responsive regarding the limitations of the PocketHound™ device.
Known Correctional Users, References and Contacts (List)	See Appendix F
Cost of Device and Accessories (Itemize)	$499 (plus shipping), includes charger. Volume discounts offered in multiples of 5-10-25-50-100 units (e.g., 20% discount for 25-49 units).
Other Comments (Narrative)	The PocketHound™ requires phones to be ON in order to be detected. The unit requires frequent "threshold adjustments." There is an Auto-Threshold Adjustment feature that automatically re-sets the threshold every 20 seconds; however, the trainer does not recommend the use of this feature. The PocketHound™ can detect all current cell phone frequencies up to 4LTE. The device cannot detect Wi-Fi or Bluetooth frequencies.

Exhibit 16. WolfHound Pro™ Product Information and Specifications

Manufacturer Name	Berkeley Varitronics Systems, Inc. (BVS)
Full Product Name	WolfHound Pro™
Model Number	0060-P-USEU
Software/Firmware Version (if applicable)	1.18 Firmware
Technology (RF, NLJD, Other)	RF
FCC Certification Required (Y/N)	No
Physical Description (to include photograph of device)	Hand-held unit with four biofeedback indicators (laser light, graphic LCD display, strobed vibrator, strobed audible alert); trackball control; omni-directional and direction-finding antennas; battery strength indicator; and micro-USB port. (See attached photographs and product specification sheet at Appendix I.)
Dimensions (LxWxH)	7.5 in. x 4.125 in. x 3.25 in. (handset-only); 10 in. x 5.5 in. x 7.5 in. (with direction finding, or DF antenna and laser bracket attached - typical configuration).
Weight (lbs./oz.)	18 oz. with omni-directional antenna; 30 oz. with direction finding (DF) antenna.
Battery Use (Estimated Continuous Operating Time and Re-Charge Time)	~4-6 hrs. of continuous use; ~3-4 hrs. to re-charge.
Battery Type	Rechargeable internal lithium.
DC Power Option (Y/N)	Yes, with DC battery charger
Vendor-Reported Detection Range (in./ft.)	~150 ft.
Detection Reporting (Graphical Map, Directional Arrow, Signal Strength, Ability to Detect Multiple Targets, etc.) (Narrative)	Four biofeedback indicators (laser light, graphic LCD display, strobed vibrator, strobed audible alert) for signal strength and directional indication.
Internal Log/Use Reporting (Y/N)	Yes, if used in stationary mode with optional ($250) logging software. Software can differentiate between voice calls and text transmissions.
Passive vs. Active Operation (NOTE: RF = Passive; NLJD = Active)	Passive (RF).
Manufacturer's Warranty Period (Number of Months plus Extended Warranty Cost)	The WolfHound Pro™ includes a one-year warranty against manufacturer's defects. If desired, BVS offers an additional one-year extended manufacturer's warranty for 8% of the purchase price (total of two years); or an additional two-year extended manufacturer's warranty for 12 percent of the purchase price (total of three years). This warranty covers any defects, but does not cover batteries, misuse or abuse. The customer is responsible for shipping both ways for any warranty claims (~three to five day turnaround). Firmware updates are provided free of charge.
Manufacturer's Brochures, Sales Literature and/or Technical Data Sheets	See Appendix I
Manufacturer's Claims and Representations (Narrative)	BVS is quite open about the advantages and disadvantages of RF sensing technology. The trainer was candid and responsive regarding the limitations of the WolfHound Pro™ device.
Known Correctional Users, References and Contacts (List)	See Appendix F
Cost of Device and Accessories (Itemize)	$2,400 (plus shipping), includes hardshell case, charger, earbud headphones, omni-directional and direction-finding antennas. Volume discounts offered in multiples of 5-10-25-50-100 units (e.g., 20% discount for 25-49 units.) Logging software (ver. 1.10) is a $250 option.
Other Comments (Narrative)	The WolfHound Pro™ requires phones to be ON in order to be detected. The device can detect cordless phones in DECT 6.0 detection mode. The logging software writes to a searchable SQL database. The WolfHound Pro™ can detect all current cell phone frequencies up to 4LTE. The device cannot detect Wi-Fi or Bluetooth frequencies.

Exhibit 17. Orion 2.4™ Product Information and Specifications

Manufacturer Name	Research Electronics International (REI)
Full Product Name	Orion NJE-2.4 Non-Linear Junction Evaluator™
Model Number	2.4
Software/Firmware Version (if applicable)	The current software/firmware version of the Orion 2.4™ is 1.00.1311220726, dated Nov. 22, 2013. Firmware updates are free and available for download on REI's website. The Orion 2.4™ has a USB port for updating firmware with a computer or laptop.
Technology (RF, NLJD, Other)	NLJD
FCC Certification Required (Y/N)	Yes, FCC approval documentation provided (see Appendix K)
Physical Description (to include photograph of device)	Hand-held unit with extension pole and graphic display indicator, including an auto-off feature, clock, battery strength indicator, USB port, built-in flashlight. (See attached photographs and product specification sheet at Appendix J.)
Dimensions (LxWxH)	22.4 in. x 3.75 in. x 3 in. (pole extends overall length to 58 in.).
Weight (lbs./oz.)	2.8 lbs. (case weight with accessories is 11.6 lbs.).
Battery Use (Estimated Continuous Operating Time and Re-Charge Time)	~Eight hours of continuous use, ~2.5 hours to recharge.
Battery Type	Internal Rechargeable, 10.8 V Lithium Ion (2 Included)
DC Power Option (Y/N)	Yes, using the AC battery charger.
Vendor-Reported Detection Range (in./ft.)	~6 in.-12 in. (varies by power output and target).
Detection Reporting (Graphical Map, Directional Arrow, Signal Strength, Ability to Detect Multiple Targets, etc.) (Narrative)	Bar Graph Signal Strength Indicator. No Directional Indication.
Internal Log/Use Reporting (Y/N)	No
Passive vs. Active Operation (NOTE: RF = Passive; NLJD = Active)	Active (NLJD)
Manufacturer's Warranty Period (Number of Months plus Extended Warranty Cost)	The Orion 2.4™ includes a one-year warranty against manufacturer's defects. The Orion 2.4™ does not require scheduled maintenance or calibration. Customers may periodically send their equipment to REI for inspection and testing, and REI typically does not charge for this unless there are any required hardware repairs. If desired, REI can offer an additional one-year extended manufacturer's warranty for $600 (total of two years). This warranty covers any defects, but does not cover batteries, misuse or abuse. The customer is responsible for shipping both ways for any warranty claims.
Manufacturer's Brochures, Sales Literature and/or Technical Data Sheets	See Appendix J
Manufacturer's Claims and Representations (Narrative)	REI is quite open about the advantages and disadvantages of NLJD technology. The trainer was candid and responsive regarding the limitations of the Orion 2.4™ device.
Known Correctional Users, References and Contacts (List)	REI considers the client list to be proprietary per Lee Jones, director of sales. He declined to provide this information. It is public information and well-known in the corrections technology community that the Tennessee Department of Corrections was an early adopter of this technology.
Cost of Device and Accessories (Itemize)	$15,000, includes all accessories (headphones, charger, two lithium ion batteries and a hard-shell carrying case). Software updates are always free of charge.
Other Comments (Narrative)	Multiple battery chargers can be daisy-chained. The device requires the user to make frequent power setting adjustments to narrow the focus of the target location.

8. VENDOR TRAINING

Participating vendors were required to provide training onsite (at no cost) to approximately 15-20 persons, consistent with the level of training that they would normally provide to any new customer on equipment delivery. They were specifically asked to include operating/training manuals, CDs/DVDs , warranty information, etc., and to work with the facility manager to schedule the end-user training on dates/times most convenient to the facility. They were advised that a train-the-trainer format was preferred. An overview of the training provided and a summary of the evaluation forms completed post-training are presented below.

8.1 REI Orion 2.4™. REI provided a half-day of training on the Orion 2.4™ NLJD device on Feb. 26, 2014. REI's director of training provided handouts to each of the 17 participants (see Appendix J) and reviewed the operation of the device via a Microsoft® PowerPoint presentation. Handouts included a bound copy of PowerPoint screenshots and a sales brochure that presented device specifications.

The REI trainer provided opportunities for questions and answers throughout his presentation. He also provided opportunities for hands-on experience with the device. For training purposes, he brought six devices, which afforded all participants an opportunity to use the equipment. In addition to the prop targets and concealment vessels that the trainer brought along for demonstration purposes, he allowed participants to conceal targets in other common hiding places. At the conclusion of the training, participants indicated that they were comfortable with operating the Orion 2.4™.

A review of the evaluations completed at the end of the training session reveals that the participants gave the REI trainer a 4.4 average rating (out of 5.0). All participants reported that the course materials helped them learn how to use the equipment. Every participant noted that the REI trainer adequately addressed all questions presented to him. All but one participant reported getting enough hands-on time to learn to use the equipment; the hands-on portion of the training was most frequently cited as the one thing that the participants liked best. Their negative comments did not focus on the training per se; but rather, on the inherent limitations of NLJD technology. Some participants noted that the REI trainer was "upfront;" and that he provided a "candid explanation" of the limitations of the technology and the Orion 2.4™.

8.2 BVS MantaRay™, PocketHound™ and WolfHound Pro™. BVS provided a full day of training on the three devices (MantaRay™, PocketHound™ and WolfHound Pro™) on Feb. 28, 2014. The training was provided by the BVS Eastern USA and Canadian regional sales manager. He reviewed the operation of each device via a PowerPoint presentation. He also had a video camera setup that enabled the participants to view the WolfHound Pro™ displays on a screen as he walked through each menu. The handouts provided to the 17 participants (see Appendixes G, H and I) included a bound copy of screenshots of the WolfHound Pro™ menus and sales brochures that presented the specifications for the MantaRay™ and PocketHound™ devices. In addition to the print materials, BVS attempted to provide electronic copies of the training/sales materials on flash drives; however, the files were

corrupted and could not be opened or read. In addition, PA DOC policy prevents staff from introducing flash drives into the facility, so the flash drives could not have been used even if the files on them had not been corrupted. BVS subsequently provided electronic copies of the Quick Reference Guides for the three devices.

The BVS trainer provided opportunities for questions and answers throughout his presentation. He also provided some limited opportunities for hands-on experience with the device. With only one of each device to work with, there was not enough time for all the participants to have an opportunity to use the equipment. In addition to the prop targets and concealment vessels that the BVS trainer brought along for demonstration purposes, he allowed the participants to conceal the targets in other common hiding places. At the conclusion of the training, participants indicated that they were comfortable with the operation of the Manta-Ray™, PocketHound™ and WolfHound Pro™ devices.

A review of the evaluations completed at the end of the training session reveals that the participants gave the BVS trainer a 3.75 average rating (out of 5.0). Most participants reported that the course materials helped them learn how to use the equipment. Every participant noted that the BVS trainer adequately addressed all questions presented to him. Half of the participants reported that they did not receive enough hands-on time to learn to use the equipment. (The need for more hands-on time with the equipment was the most frequently cited comment.) Several participants noted that the BVS trainer was knowledgeable about the products and that he took the time to answer questions about the devices. They also noted that he was forthright when explaining the limitations of the RFD and FMD technologies.

Although BVS provided training at no cost for the purpose of this T&E, the company does not usually include such training with device purchase. Onsite training is available and can be provided at additional cost on request (currently $1,500/day plus expenses).

9. BASELINE TESTS

The Baseline Tests took place at SCI-Chester over a 2.5-day period from March 3-5, 2014. (See the Baseline Test Protocols at Appendixes A and C.) Personnel involved in the Baseline Testing were all members of the Search Team operating under the direct supervision of Lt. (now Capt.) Thorton Felder and Capt. Lee Colston (now retired). The number of staff participating in the Baseline Tests varied between seven and 11.

Baseline Tests were conducted using multiple phone types operating on different frequencies. The tests used SIM cards and cell phone chargers as cell phone accessory targets, and MP3 players as targets to simulate authorized electronic devices (AEDs) that inmates are permitted, by policy, to have in their possession. Exhibit 18 lists the inventory of targets used for Baseline Testing.

Each test target was concealed in various configurations (OFF, ON/Passive (standby), ON/Active modes) in multiple concealment vessels (cardboard box, concrete block, peanut butter jar, wrapped in aluminum foil). Each

Exhibit 18. Inventory of Targets Used for Baseline Testing

Equipment Inventory	Type
Samsung 157 Cell Phone	GSM Burner**
Samsung 157 Cell Phone	GSM Burner
AT&T Avail 2 Cell Phone – manufactured by ZTE	GSM Smart*
AT&T Avail 2 Cell Phone – manufactured by ZTE	GSM Smart
Kyocera Kona Cell Phone	CDMA Burner
Kyocera Kona Cell Phone	CDMA Burner
Kyocera Event Cell Phone	CDMA Smart
Kyocera Event Cell Phone	CDMA Smart
T-Mobile SIM Card	Cell Phone Accessory
T-Mobile SIM Card	Cell Phone Accessory
Cell Phone Charger	Cell Phone Accessory
Eclipse Portable Media Player – 180G2 – 4GB	Authorized Electronic Device (AED)
Eclipse Portable Media Player – 180G2 – 4GB	Authorized Electronic Device (AED)

* Smartphone: A cell phone with advanced functionality to include Internet access.

** Burner phone: A low-cost, no-contract cell phone with only voice and text messaging capability.

of the four hand-held cell phone detection devices was used to attempt to locate each target in each vessel.

Participants recorded results on the Cell Phone Detection Device T&E Worksheet – Baseline Tests form (see Appendix N). These forms noted the test number (which corresponds with the Baseline Test Protocols - see Appendix C), the tester's name, the date, any notable device settings, the range of detection (feet/inches), whether there was a true alarm (i.e., the device alerted on an actual cell phone or cell phone accessory) or a false alarm (i.e., the device alerted on anything other than an actual cell phone or cell phone accessory) and (for phones in ON/Passive mode only) whether the device provided a power-up true alarm.

Below is a summary of the results of the Baseline Testing for each device.

9.1 BVS, MantaRay ™. The MantaRay™ is a FMD device. The MantaRay™ Quick Start User's Guide notes that it can detect cell phones whether they are on or off. The literature cautions users:

> MantaRay™ is a very sensitive instrument. Some metallic objects other than phones may trigger the MantaRay™ though most metal should not trigger false detections. You will notice that waving it very quickly in the air will produce false triggers and not waving it at all will produce no triggers (even if there is a cell phone inches away from it). This is because MantaRay™ is constantly taking measurements based on minute changes in its orientation to ferromagnetic objects and the earth's electromagnetic energy field. (See MantaRay™ Quick Start User's Guide, Appendix G, p. 2.)

This point was reiterated during the training session. The trainer also noted that the MantaRay™ is not specifically designed to search cells, but rather, is designed to search people. The BVS marketing literature, however, suggests that the MantaRay™ is intended for searching both. The trainer recommended that the MantaRay™ be used in stationary mode (rather than hand-held mode) to search objects.

If the MantaRay™ is to be used in stationary mode, it must be placed in an open area away from all potential ferromagnetic targets, and it must go through a 15-minute calibration cycle. If the device is disturbed in the slightest, the 15-minute calibration cycle must be repeated. Once calibrated, objects to be searched must be passed within six inches of the device in order to be scanned. Since the intended application for the purposes of this T&E was to search for objects in cells (consistent with the established T&E Protocol), the MantaRay™ was not tested in the stationary mode. Also, the PA DOC cell search procedures do not require corrections officers on the Search Team to remove items from cells in order to conduct a cell search. To do so would be time-consuming and unreasonably burdensome.

Exhibit 19 summarizes the results of the Baseline Testing for the MantaRay™. The TAR is calculated as the number of tests involving a concealed cell phone in which the device produced a positive alarm divided by the total number of tests with a cell phone. The FAR is calculated as the number of tests NOT involving a concealed cell phone in which the device produced a positive alarm divided by the total number of tests without a cell phone. Cell phone accessories are considered cell phones for purposes of these calculations. Alerts on AEDs are calculated as false alarms. Alerts on empty vessels are coded as FAR Empty. See Appendixes A and C for Baseline Test details.

The Baseline Testing revealed that the MantaRay™ device must be very close to the target (on average, one inch from the outside of the concealment vessel) before it detects a cell phone. It performed the best on targets concealed in peanut butter jars and aluminum foil (70 percent TAR each), and worst on targets concealed in concrete blocks (27 percent TAR). The overall TAR for all concealment vessels was 53 percent. That is to say, the MantaRay™ could locate a concealed cell phone about half the time.

The overall FAR was 16 percent. Although this might be considered an acceptable operational FAR, it must be noted that four out of four tests on empty targets resulted in a FAR. When questioned about the extraordinarily high FAR on empty targets, the BVS representative responded: (via email on March 10, 2014) "Your observations at SCI Chester must have been due to the corrections officers still learning the scanning technique or some nearby electromagnetic interference."

The *MantaRay™ Quick Start User's Guide* provides the following guidance regarding Handheld Mode Operational Procedures (see Appendix G, p. 2.):

Exhibit 19. Summary of the Results of the Baseline Testing for the MantaRay™

Vessel[2]	Average[1] Range of Detection (inches)	TAR All (%)	FAR All (%)	TAR ON/Active (%)	FAR ON/Active (%)	TAR ON/Passive (%)	FAR[4] ON/ Passive (%)	TAR[3] OFF (%)	FAR[4] OFF (%)	FAR[5] Empty (%)
Cardboard	1	47%	31%	100%	25%	20%	40%	30%	17%	100%
Concrete	1	27%	6%	50%	0%	6%	0%	17%	0%	100%
Peanut Butter Jar	1	70%	18%	N/A	N/A	75%	0%	67%	17%	100%
Aluminum Foil	1	70%	9%	N/A	N/A	75%	0%	67%	0%	100%
Overall[1]	1	53%	16%	75%	13%	44%	10%	46%	8%	100%

Assumptions and Notes:

1. Average Range of Detection (in inches) is rounded and recorded at the minimum range. This is the distance that the operator first recorded an alert from outside the concealment vessel. The target cell phones were some distance farther inside the various vessels. Average distances were applied to the various vessels to account for the extra distance that the target cell phones were away from the hand-held detection device when the alerts were first recorded. The Range of Detection is reported as a range (low-high). The following average distances were applied to establish the Range of Detection:

   a. Cardboard - +6 in. (i.e., Range of Detection: 1 – 7 in.)

   b. Concrete - +2 in. (i.e., Range of Detection: 1 - 3 in.)

   c. Peanut Butter Jar - +1 in. (i.e., Range of Detection: 1 - 2 in.)

   d. Aluminum Foil - 0 in. (i.e., Range of Detection: 0 - 1 in.)

   e. Overall Average Range of Detection: One inch (1 in.) +/-average thickness of the concealment vessel.

2. Some tests produced both False Alarms and True Alarms depending on the vessels being scanned.

3. Alerts on Cell Phone Accessories were coded as TAR OFF.

4. Alerts on AEDs were coded as "FAR Passive" if ON or FAR OFF if OFF.

5. FAR Empty alerts are reported due to a notable FAR on benign targets. Four out of four tests on Empty Targets resulted in a FAR (100 percent). There were numerous FARs on each of the empty concealment vessels at various times (but not all times) throughout the Baseline Testing. Although the total FAR percentage is reported here as 100 percent due to the research design and coding protocol, in actuality, the FAR Empty rate is approximately 65 percent.

For best results follow these simple guidelines:

- *SWEEP up and down or back and forth in a uniform speed and motion parallel to the area of interest.* ***NEVER*** *tilt or turn while sweeping.*
- *MAINTAIN DISTANCE of 0 to 6 inches from the surface while sweeping.*

The technique described above was reinforced during the training provided by the BVS sales representative. All of the users involved in the Baseline Testing used this method. Despite their best efforts to use the device in the prescribed manner, the MantaRay™ produced an unacceptably high rate of false alarms on empty targets. The device is simply too sensitive to motion. The corrections officers quickly lost confidence in the MantaRay™'s ability to produce reliable results.

As previously noted, the BVS representative suggested that the device is better suited to be operated in the stationary versus the hand-held mode. Performance in the stationary mode was not tested or evaluated since the T&E protocol was designed around a cell search scenario to be conducted consistent with the PA DOC's standard cell search procedures.

9.2 BVS, PocketHound™. The PocketHound™ is designed to only detect cell phones that are ON. The Baseline Tests revealed that the PocketHound™ can detect cell phones in the ON/Active mode 100 percent of the time at a distance of 70 to 100 feet. The blue LED lights and the vibration indications on the device provide a signal strength indication that allowed users to walk directly to the source targets.

The PocketHound™ is significantly less effective with cell phones in the ON/Passive (standby) mode due to the nature of the way cell phones communicate with nearby cell towers. A cell phone in ON/Passive (standby) mode only "pings" the nearest cell tower periodically. The time between "pings" can vary from a few seconds to a few minutes. According to BVS, the time between "pings" could be up to 20 minutes (see Appendix H, PocketHound™ Quick Reference User's Guide, p. 2). The amount of time between "pings" varies by carrier, distance from the cell tower and other environmental factors. Therefore, the PocketHound™ may or may not detect a cell phone in ON/Passive mode. Due to the intermittent nature of the "pings," the device may alert the user to a cell phone in the vicinity, but the "ping" will not remain active long enough to lead the user to it.

For a description of how cellular telephone systems communicate with cell phone towers and networks, please refer to the following websites:

http://electronics.howstuffworks.com/cell-phone3.htm

http://thetelecom4u.blogspot.com/2013/05/cellular-telephone-systems.html

http://en.wikipedia.org/wiki/Control_channel

Exhibit 20 summarizes the results of Baseline Testing for the PocketHound™. The TAR is calculated as the number of tests involving a concealed cell phone in which the device produced a positive alarm divided by the total number of tests with a cell phone. The FAR is calculated as the number of tests NOT involving a concealed cell phone in which the device produced a positive alarm divided by the total number of tests without a cell phone. See Appendixes A and C for Baseline Test details.

Note that the overall TAR and the individual concealment vessel true alarm rates are diminished by the cell phones in ON/Passive mode for the reasons stated above. In these tests, the PocketHound™ detected cell phones in the ON/Active mode 100 percent of the time at a distance of 70 to 100 feet through all of the concealment vessels tested (i.e., cardboard boxes and concrete blocks). The device was not tested against cell phone targets in ON/Active mode concealed in peanut butter jars or aluminum foil because inmates do not generally keep phones in ON/Active mode while concealed in these vessels (see Baseline Test Protocols, Appendixes A and C).

Also note that the Baseline Testing did not reveal any false alarms. If the PocketHound™ indicated an alert, the users had confidence that it indicated the presence of a cell phone in the vicinity.

The obvious downside of the PocketHound™ device is that it only detects RF energy, which requires that the

Exhibit 20. Summary of the Results of the Baseline Testing for the PocketHound™

Vessel[2]	Average[1] Range of Detection (inches)	TAR All (%)	FAR All (%)	TAR ON/Active (%)	FAR ON/Active (%)	TAR ON/Passive (%)	FAR[4] ON/Passive (%)	TAR[3] OFF (%)	FAR[4] OFF (%)	FAR[5] Empty (%)
Cardboard	76	33%	0%	100%	0%	20%	0%	0%	0%	0%
Concrete	76	47%	0%	100%	0%	60%	0%	0%	0%	0%
Peanut Butter Jar	88	20%	0%	N/A	N/A	50%	0%	0%	0%	0%
Aluminum Foil	73	20%	0%	N/A	N/A	50%	0%	0%	0%	0%
Overall[1]	78	30%	0%	100%	0%	45%	0%	0%	0%	0%

[1]Note: The device detected at the maximum protocol test range (20 feet). As a result, the test protocol was amended during execution to allow for an exploration of the maximum detection range.

target cell phone must be ON. If the contraband cell phone is in the ON/Passive mode, it may or may not alert the operator and it will not provide a signal that lasts long enough to pinpoint the source. If, however, the target cell phone is ON/Active (i.e., actively engaged in a telephone call), the PocketHound™ proved to be very reliable and accurate. The signal strength LED lights and vibration indications allowed operators to hone in on the source and to recover the target cell phone concealed in cardboard and concrete with 100-percent accuracy.

9.3 BVS, WolfHound Pro™. The WolfHound Pro™, like the PocketHound™, is an RFD device designed to only detect cell phones that are ON. The baseline tests revealed that the WolfHound Pro™ detected cell phones in the ON/Active mode 100 percent of the time at a distance of 80 to 125 feet. The green laser light, the audio and visual indicators, and the vibration features provide both signal strength and directional indicators that allowed the users to walk directly to the source targets.

The WolfHound Pro™ has the same problem with detecting cell phones in the ON/Passive mode as does the PocketHound™. The intermittent nature of the cell phone's communication with the cell tower makes it difficult to find contraband cell phones in this mode.

Exhibit 21 summarizes the results of the Baseline Testing for the WolfHound Pro™. The TAR is calculated as the number of tests involving a concealed cell phone in which the device produced a positive alarm divided by the total number of tests with a cell phone. The FAR is calculated as the number of tests NOT involving a concealed cell phone in which the device produced a positive alarm divided by the total number of tests without a cell phone. See Appendixes A and C for Baseline Test details.

Also like the PocketHound™, the overall TAR and the individual concealment vessel TAR for the WolfHound Pro™ are diminished by the cell phones in ON/Passive mode for the reasons previously stated. Note that, in comparison with the PocketHound™, the WolfHound Pro™ detected the cell phones at a slightly greater overall distance (~78 feet versus ~86 feet), and with a greater TAR overall (30 percent versus 46 percent). In these tests, the WolfHound Pro™ detected cell phones in the ON/Active mode 100 percent of the time at a distance of 80 to 125 feet through all of the concealment vessels tested (i.e., cardboard boxes and concrete blocks). The device was not tested against cell phone targets in ON/Active mode concealed in peanut butter jars or aluminum foil because inmates do not generally keep phones in ON/Active mode while concealed in these vessels (see Baseline Test Protocols, Appendixes A and C).

Also note that the Baseline Testing did not reveal any false alarms. If the WolfHound Pro™ indicated an alert, the users had confidence that it was indicating the presence of a cell phone in the vicinity. The directional antenna that comes with the device seemed to perform much better than the omnidirectional antenna

Exhibit 21. Summary of the Results of the Baseline Testing for the WolfHound Pro™

Vessel	Average[1] Range of Detection (inches)	TAR All (%)	FAR All (%)	TAR ON/Active (%)	FAR ON/Active (%)	TAR ON/Passive (%)	FAR ON/Passive (%)	TAR[3] OFF (%)	FAR OFF (%)	FAR Empty (%)
Cardboard	95	33%	0%	100%	0%	20%	0%	0%	0%	0%
Concrete	100	47%	0%	100%	0%	60%	0%	0%	0%	0%
Peanut Butter Jar	50	30%	0%	N/A	N/A	75%	0%	0%	0%	0%
Aluminum Foil	100	75%	0%	N/A	N/A	27%	0%	0%	0%	0%
Overall[1]	86	46%	0%	100%	0%	46%	0%	0%	0%	0%

[1]Note: The device detected at the maximum protocol test range (20 feet). As a result, the test protocol was amended during execution to allow for an exploration of the maximum detection range.

(also included with the base unit). All of the Baseline Tests were completed using the directional antenna.

The obvious limitation of the WolfHound Pro™ is that it only detects RF energy, which requires that the target cell phone must be ON. If the contraband cell phone is in the ON/Passive mode, it may or may not alert the operator and it will not provide a signal that lasts long enough to pinpoint the source. If, however, the target cell phone is ON/Active (i.e., actively engaged in a telephone call), the WolfHound Pro™ proved to be very reliable and 100-percent accurate. The green laser light, the audio and visual indicators, and the vibration features provide both signal strength and directional indicators that allowed the users to hone in directly on the source targets.

9.4 REI, Orion 2.4™. According to REI, the Orion 2.4™ is designed to "detect the presence of hidden electronics regardless of whether they are operational." The Orion 2.4™ transmits a "digitally modulated transmit signal with correlated 2nd and 3rd harmonic response" at the 2.4GHz frequency. This is supposed to "improve detection and minimize interference," allowing the device to detect "small electronics such as SIM cards and cell phones." (See the REI sales brochure, Appendix J.)

Exhibit 22. Summary of the Results of the Baseline Testing for the Orion 2.4™

	Average[1]	TAR	FAR	TAR	FAR	TAR	FAR[4]	TAR[3]	FAR[4]	FAR[5]
Vessel[2]	Range of Detection (inches)	All (%)	All (%)	ON/Active (%)	ON/Active (%)	ON/Passive (%)	ON/Passive (%)	OFF (%)	OFF (%)	Empty (%)
Cardboard	2	67%	19%	100%	25%	60%	0%	50%	17%	100%
Concrete	2	67%	19%	75%	0%	60%	20%	67%	17%	100%
Peanut Butter Jar	2	90%	9%	N/A	N/A	100%	0%	83%	17%	0%
Aluminum Foil	1	50%	18%	N/A	N/A	75%	0%	33%	17%	100%
Overall[1]	2	68%	16%	88%	13%	74%	5%	58%	17%	75%

Assumptions and Notes:

1. Average Range of Detection (in inches) is rounded and recorded at the minimum range. This is the distance that the operator first recorded an alert from outside of the concealment vessel. The target cell phones were some distance farther inside the various vessels. Average distances were applied to the various vessels to account for the extra distance that the target cell phones were away from the hand-held detection device when the alerts were first recorded. The Range of Detection is reported as a range (low-high). The following average distances were applied to establish the Range of Detection:

   a. Cardboard - +6 in. (i.e., Range of Detection: 2 - 8 in.)

   b. Concrete - +2 in. (i.e., Range of Detection: 2 – 4 in.)

   c. Peanut Butter Jar - +1 in, (i.e., Range of Detection: 2 – 3 in.)

   d. Aluminum Foil - 0 (i.e., Range of Detection: 0 – 1 in.)

   e. Overall Average Range of Detection: Two inches (2 in.) +/-average thickness of the concealment vessel.

2. Some tests produced both False Alarms and True Alarms depending on the vessels being scanned.

3. Alerts on Cell Phone Accessories were coded as TAR OFF.

4. Alerts on AEDs were coded as "FAR Passive" if ON or FAR OFF if OFF.

5. FAR Empty alerts are reported due to a notable FAR on benign targets. Three out of four tests on empty targets resulted in a FAR (75 percent). There were numerous FARs on each of the empty concealment vessels at various times (but not all times) throughout the Baseline Testing. While the total FAR percentage is reported here as 75 percent due to the research design and coding protocol, in actuality, the FAR Empty rate is approximately 72 percent.

Exhibit 22 summarizes the results of Baseline Testing for the Orion 2.4™. The TAR is calculated as the number of tests involving a concealed cell phone in which the device produced a positive alarm divided by the total number of tests with a cell phone. The FAR is calculated as the number of tests NOT involving a concealed cell phone in which the device produced a positive alarm divided by the total number of tests without a cell phone. Cell phone accessories are considered cell phones for purposes of these calculations. Alerts on AEDs are calculated as false alarms. See Appendixes A and C for Baseline Test details.

The Orion 2.4™ detected cell phones and cell phone accessories in 68 percent of the test iterations during the Baseline Testing, the highest overall TAR of all four hand-held cell phone detection devices tested. The overall false alarm rate was identical to the MantaRay™'s at 16 percent. While this again might be considered an acceptable operational FAR, it must be noted that the device also produced a significant false alarm rate of 75 percent on empty concealment vessel tests. In most cases, the device had to be in very close proximity to the target (about one to two inches from the outside of the concealment vessel plus the depth of the phone inside the vessel) before it would alert. The unacceptably high FAR on empty vessels was extremely frustrating to the corrections officers conducting the tests. It did not take very long for them to lose confidence in the device's ability to discriminate between a cell phone and other targets.

The Orion 2.4™ requires the operator to make frequent power adjustments. The FAR and the frequent power setting adjustments greatly increase the amount of time required to complete a scan, because the operator must scan and re-scan the same area multiple times in order to either locate a cell phone or to identify the source of the false alarm.

9.5 Summary Comparison of Baseline Test Results. **Exhibit 23 provides a summary comparison of the Baseline Test results. Once again, the reader is cautioned against making direct comparisons between dissimilar technologies. FMD and NLJD devices approach the problem of cell phone detection very differently than RFD devices. RFD device manufacturers only claim the capability of detecting cell phones that are ON. They stipulate that RFD devices are of no use in detecting cell phones that are OFF. FMD and NLJD device manufacturers claim to be able to detect cell phones whether they are ON or OFF. The choice of device must be driven by the concept of operations.**

The TAR is calculated as the number of tests involving a concealed cell phone in which the device produced a positive alarm divided by the total number of tests with a cell phone. The FAR is calculated as the number of tests NOT involving a concealed cell phone in which the device produced a positive alarm divided by the total number of tests without a cell phone. Cell phone accessories are considered cell phones for purposes of these calculations. See Appendixes A and C for Baseline Test details.

The Baseline Testing demonstrated that the two RFD devices (PocketHound™ and WolfHound Pro™) provide the best detection and location capability, but only if the target cell phone is actively engaged in a telephone call (i.e., in On/Active mode). When a cell phone is in

Exhibit 23. Summary Comparison of Baseline Test Results

Device	Percent True Alarm Rate (Overall)	Percent False Alarm Rate (Overall)	Percent True Alarm Rate (Active)	Percent True Alarm Rate (Passive)	Percent True Alarm Rate (OFF)	Percent False Alarm Rate (Empty)	Average Range of Detection (Inches/Feet)
MantaRay™ (FMD)	53%	16%	38%	44%	46%	100%	1 inch
Orion 2.4™ (NLJD)	68%	16%	44%	74%	58%	75%	2 inches
WolfHound Pro™ (RFD)	46%	0%	100%	46%	0%	0%	86 feet
PocketHound™ (RFD)	30%	0%	100%	45%	0%	0%	78 feet

On/Active mode, both RFD devices demonstrated a 100-percent detection rate and the ability to hone in directly to the source while producing zero false alarms. They also demonstrated their ability to detect cell phones at distances of 70 to 125 feet.

The overall TAR for the RFD devices is diminished by cell phones in the ON/Passive mode. Although the RFD devices may detect a fleeting signal when the cell phone is in standby mode, the signal does not remain active long enough to hone in on the source. The RFD devices have no ability to detect cell phones that are turned off. The inability to detect cell phones that are turned off significantly affects the overall TAR for both of the RFD devices. The PocketHound™ had the lowest overall TAR of all of the devices at 30 percent and the WolfHound Pro™ had the second lowest overall TAR at 46 percent.

Both the MantaRay™ and the Orion 2.4™ demonstrated an ability to detect cell phones that are turned off with a 46 percent and a 58 percent TAR, respectively. The MantaRay™ and the Orion 2.4™ both produced a 16-percent overall FAR compared to the 0 percent overall FARs for the PocketHound™ and the Wolf-Hound Pro™. The FMD and NLJD devices had better overall TARs than the RFD devices at 53 percent for the MantaRay™ and 68 percent for the Orion 2.4™; however, they both produced an unacceptably high FAR on the empty vessel tests at 100 percent and 75 percent, respectively. Both technologies require the operator to be within a few inches of the target before they will alert.

At the conclusion of the Baseline Testing, the Operational Tests were conducted. These results are presented next.

10. OPERATIONAL TESTS

Corrections officers conducted Operational Tests over a period of 2.5 days. See the Operational Test Protocols at Appendixes B, D and E.

10.1 Patrol Scenario Tests. The first set of Operational Tests (the Patrol Scenario Tests) was limited to the two RFD devices (PocketHound™ and WolfHound Pro™) because they were the only devices that proved capable during Baseline Testing of detecting cell phones at distances greater than 10 feet (the depth of a typical inmate cell from front to rear). Therefore, the FMD device (MantaRay™) and the NLJD device (Orion 2.4™) were excluded from Patrol Scenario Testing.

Also, as expected and demonstrated during the Baseline Testing, the RFD devices proved that they can only detect cell phones that are ON (i.e., emanating RF energy). Therefore, the Patrol Scenario Testing was limited to cell phone targets that were in either ON/Active or ON/Passive mode. No AEDs or cell phone accessories were planted in inmate cells. The target cell phones were placed in cardboard boxes in the inmate cells.

Since inmates do not generally conceal cell phones that are ON in aluminum foil or peanut butter, these target/vessel configurations were not used during Patrol Scenario Testing. The cell wall construction served as a natural concrete vessel so there was no need to conceal any targets in concrete blocks during the Patrol Scenario Testing. Patrol Scenario Testing was limited to the cardboard vessel only. The set of 18 tests was repeated for a total of 36 tests (see Appendixes B and D).

10.1.1 BVS, PocketHound™. The PocketHound™ demonstrated a 100 percent TAR for cell phones in the ON/Active mode. In all but one ON/Passive mode test, the device detected a signal (88 percent of the time), but as mentioned in the Baseline Testing section above, the signal proved too fleeting to enable the operator to locate the source of the signal. No cell phones in the ON/Passive mode were located during Patrol Scenario Testing. Overall, the device demonstrated a 94 percent TAR for cell phones in both the ON/Active and ON/Passive modes. There were no false alarms reported. (See Exhibit 24.)

Exhibit 24. Patrol Scenario Test Results - PocketHound™

Target Phone Mode	True Alarm Rate (TAR)	False Alarm Rate (FAR)	Able to ID Correct Cell
ON/Active	100%	0%	100%
ON/Passive	88%	0%	0%
Overall	94%	0%	50%

Note: The Patrol Scenario Tests involved target cell phones in the ON/Active or ON/Passive modes only. The PocketHound™ cannot detect phones in the OFF mode and was not tested against phones in the OFF mode.

In every case where the target was a cell phone in the ON/Active mode, the operator correctly identified the cell where the cell phone was hidden. The PocketHound™ consistently penetrated the reinforced eight-inch concrete walls and the steel cell doors to locate the cell phones hidden inside the cardboard boxes. In every case where the target was a cell phone in the ON/Passive mode, the operator could not correctly identify the cell where the cell phone was hidden. For the purposes of this T&E, half of the tests were with cell phones in the ON/Active mode and half of the tests were with cell phones in the ON/Passive (standby) mode. Operators identified the correct cell 50 percent of the time (i.e., only for phones in ON/Active mode).

In the real-world correctional environment, inmates do not actively use their cell phones for extended periods nor do they keep their cell phones in the ON/Passive mode when not in use. SMEs agree that inmates generally keep their cell phones off and concealed when not in use. They only power up their phones when they expect to make or receive a call. This practice not only preserves the battery life of the cell phone, it minimizes the opportunities for it to be discovered and confiscated.

On average, corrections officers located the source of the signal in less than four minutes from the time that they entered the cell block with the PocketHound™. If an inmate were to keep his cell phone calls brief (under a minute or two), it is likely that he could avoid getting caught with the phone. The RFD devices would certainly detect the cell phone's RF energy, but there probably wouldn't be enough time to hone in on the signal in order to locate and confiscate the phone.

One should not assume from the data in Exhibit 24 that there is a "50-50 chance" of either device being capable of correctly identifying an inmate's cell and locating his contraband cell phone. Rather, these results demonstrate there is a 100-percent chance of being able to correctly identify the cell and recover the cell phone if the target cell phone is in the ON/Active mode (and if the inmate stays on the phone for at least four minutes); and a 0-percent chance of locating/recovering a cell phone in the ON/Passive mode. As previously noted, there is a 0-percent chance of locating/recovering a cell phone in the OFF mode.

See Exhibit 25 for a photograph of the inmate housing unit (cell block) where the Patrol Tests took place. This is a typical two-tier, medium security (Level 3), direct supervision configuration with 32 cells. Most of the cells house two inmates each. The average daily population (ADP) in the unit is 62. The approximate distance from the entrance door to the furthest cell is 92 feet. Considering the distance and the two-tier configuration, the four-minute average to get from the entrance door to the cell with the contraband cell phone is noteworthy.

Exhibit 25. Typical Inmate Housing Unit (Cell Block) at SCI-Chester

Source: SCI-Chester, 2014

Note that the PocketHound™ detected and actually located some ON/Passive cell phones during the Baseline Testing. This is likely due the relative proximity of the user to the target at the time of the random "ping." The Baseline Testing took place in the close confines of an interior hallway with the target devices at the end of the hall. It was obvious to the user that in the event of an alert, the user should continue to walk toward the known concealment vessels and target source. In some cases, the user received multiple alerts and some just happened to coincide with the moment the device was in close proximity to the phone. In the much more open confines of a typical inmate housing unit, there is simply no way to obtain any reliable directional information from the device due to the intermittent nature of the "pings" that occur with a cell phone in ON/Passive mode.

10.1.2. BVS, WolfHound Pro™. The performance of the WolfHound Pro™ during the Patrol Scenario Testing was identical to the performance of the PocketHound™ described above. (See Exhibit 26.)

Exhibit 26. Patrol Scenario Test Results – WolfHound Pro™

Target Phone Mode	True Alarm Rate (TAR)	False Alarm Rate (FAR)	Able to ID Correct Cell
ON/Active	100%	0%	100%
ON/Passive	88%	0%	0%
Overall	94%	0%	50%

Note: The Patrol Scenario Tests involved target cell phones in the ON/Active or ON/Passive modes only. The WolfHoundPro™ cannot detect phones in the OFF mode and was not tested against phones in the OFF mode.

The WolfHound Pro™ demonstrated a 100-percent TAR for cell phones in the ON/Active mode. In all but one (i.e., 88 percent of the time) ON/Passive mode test, the device detected a signal, but as mentioned above, the signal proved too fleeting to enable the operator to locate the source of the signal. Overall, the device demonstrated a 94-percent TAR for cell phones in both the ON/Active and ON/Passive modes. There were no false alarms reported. (See Exhibit 26.)

In every case where the target was a cell phone in the ON/Active mode, the operator correctly identified the cell where the cell phone was hidden. The WolfHound Pro™ consistently penetrated the reinforced eight-inch concrete walls and the steel cell doors to locate the cell phones hidden inside the cardboard boxes. In every case where the target was a cell phone in the ON/Passive (standby) mode, the operator could not correctly identify the cell where the cell phone was hidden. For the purposes of this T&E, half of the tests were with cell phones in the ON/Active mode and half of the tests were with cell phones in the ON/Passive mode. Operators identified the correct cell 50 percent of the time (i.e., only for phones in ON/Active mode).

As noted above, inmates do not actively use their cell phones most of the day nor do they keep their cell phones in ON/Passive mode during that time. SMEs agree that inmates generally keep their cell phones off and concealed when not in use. They only power up their phones when they expect to make or receive a call. This practice not only preserves the battery life of the cell phone, it also minimizes the opportunities for it to be discovered and confiscated.

On average, corrections officers located the source of the signal less than four minutes from the time that they entered the cell block with the WolfHound Pro™ as long as the target cell phone was in the ON/Active mode. If an inmate were to keep his cell phone calls brief (under a minute), it is likely that he could avoid detection by any RFD device.

Note that the WolfHound Pro™ detected some ON/Passive cell phones during the Baseline Testing. This is likely due to the relative proximity of the user to the target at the time of the random "ping." The Baseline Testing took place in the close confines of an interior hallway with the target devices at the end of the hall. It was obvious that in the event of an alert, the user should continue to walk toward the known concealment vessels and target source. In some cases, the user received multiple alerts and some just happened to coincide with the moment the device was in close proximity to the phone. In the much more open confines of a typical inmate housing unit, there is simply no way to obtain any reliable directional information from the device due to the intermittent nature of the "pings" that occur with a cell phone in ON/Passive mode. For further discussion on this topic, see Section 12. Limitations and Considerations for Future T&Es.

Exhibit 27 presents a summary comparison of the PocketHound™ and WolfHound Pro™ performance during the Patrol Scenario Tests.

10.2. Cell Search Scenario Tests. The second set of Operational Tests (Cell Search Scenario Tests) included all four hand-held cell phone detection devices (the MantaRay™, the PocketHound™, the WolfHound Pro™ and the Orion 2.4™). Since inmates do not generally conceal cell phones that are ON in aluminum foil or peanut butter, these target/vessel configurations were not used during the Cell Search Scenario Testing. The cell wall construction served as a natural concrete vessel, so there was no need to conceal any targets in concrete blocks. Testing was limited to the cardboard, peanut butter jar and aluminum foil vessels. No AEDs were planted in cells because there are a sufficient number of "organic" AEDs in inmate cells (e.g., televi-

Exhibit 27. Summary Comparison of Patrol Scenario Tests

Target Phone Mode	True Alarm Rate (TAR)	False Alarm Rate (FAR)	Able to ID Correct Cell
PocketHound™ ON/Active	100%	0%	100%
PocketHound™ ON/Passive	88%	0%	0%
WolfHound Pro™ ON/Active	100%	0%	100%
WolfHound Pro™ ON/Passive	88%	0%	0%
Overall	94%	0%	50%

sions/remote controls, radios, digital watches, etc.). Since the Baseline Testing demonstrated that RFD devices cannot detect a cell phone unless it is in ON/Active or ON/Passive mode, the two RFD devices (the PocketHound™ and the WolfHound Pro™) were not tested against cell phone targets in the OFF mode.

Also, in the interest of time and based on the results of the Baseline and Patrol Scenario Testing, the decision was made to complete only a sample of the various permutations of the Cell Search Scenario Testing. See Appendix E for the test scenarios completed (indicated by a checkmark in the left-hand column). The tests selected were intended to provide each device with the best opportunity to perform to its strength as stated by the manufacturer and/or as measured in prior test iterations. So, in general, the RFD devices were tested against cell phones in the ON/Active mode, and the FMD and NLJD devices were tested against targets in the OFF mode, as they can be expected to perform equally whether the phones are ON or OFF.

The Cell Search Scenario test results may make it appear as though the two RFD devices (the BVS PocketHound™ and the BVS WolfHound Pro™) performed the best, but this is only because they were only tested against cell phones in the ON/Active mode. These devices are of little value for finding cell phones that are in the ON/Passive mode. They will provide a fleeting indication that there is RF energy in the area, but they are not useful for locating cell phones in this configuration. Neither device is capable of detecting a cell phone that is concealed in the OFF mode. So again, the reader is cautioned against making direct comparisons between dissimilar technology solutions.

10.2.1. BVS, MantaRay™. The Cell Search Scenario Test validated what the BVS trainer said during the end-user training session: the MantaRay™ was not designed for, and does not perform well in, the cell search environment. There are simply too many ferromagnetic materials in typical inmate cells that cause false alarms. Operator hand movement was also a source of numerous false alarms. Despite the operators' best efforts to scan targets in accordance with BVS' recommended procedures, the MantaRay™ produced so many false alarms that the users quickly lost confidence in the device. The excessive false alarms significantly slowed the search process as operators had to scan, re-scan and laboriously hand search inmate personal property items in an effort to either find a cell phone or to rule out a false indication.

Exhibit 28 illustrates the results of the Cell Search Scenario Test. Overall, the MantaRay™ located a cell phone (or cell phone accessory) in the OFF mode 56 percent of the time. However, the device had a 38-percent FAR on AEDs and a 76-percent FAR on other (non-electronic) items. As noted, much of this FAR can be attributed to the over-sensitivity of the device caused by operator hand movement inherent in the cell search process.

Compared to the other hand-held cell phone detection devices tested, the MantaRay™ had the longest search time. Note that cell phones concealed in cardboard boxes took the longest to search (15 minutes), yet produced the lowest TAR at 50 percent. Operators were baffled by the FAR when scanning cardboard boxes. Speculation was that the recycled cardboard contained trace amounts of ferromagnetic metal that was causing the false alarms. A sample cardboard box was sent to BVS for testing. They determined that the false alarms were caused either by poor scanning technique or proximity to other ferromagnetic sources in the cell (per a March 10, 2014 email from the BVS representative.)

Exhibit 28. Cell Search Scenario Test Results – MantaRay™

Concealment Vessel Type	True Alarm Rate (OFF) %	False Alarm Rate (AED) %	False Alarm Rate (Other) %	Found Phone %	Search Time (Minutes)	Directional Accuracy (0-5)*
Cardboard	50	60	60	50	15	0
Peanut Butter Jar	50	20	100	50	11	1
Aluminum Foil	67	33	67	67	6	2
Overall[1]	56	38	76	56	10	1

*Directional Accuracy (0-5): 0=N/A, 1=POOR, 2=FAIR, 3=GOOD, 4=VERY GOOD, 5=EXCELLENT

The other notable limitation of the MantaRay™ device is its lack of directional accuracy. As demonstrated during the Baseline Tests, the device has to be within several inches of the target in order to signal an alert. Overall, the MantaRay™ received a Poor rating from the evaluators on directional accuracy.

10.2.2. BVS, PocketHound™. The PocketHound™ performed quite well in the Cell Search Scenario testing, but only for cell phones in the ON/Active mode. As demonstrated during Baseline Testing, if the target cell phone is in the ON/Passive mode, the device will very likely detect the signal but will be unable to locate the source. If the cell phone is in the OFF mode, the PocketHound™ cannot detect it at all.

It is acknowledged that, from an operational perspective, it is highly unlikely to find a contraband cell phone hidden in the ON/Active mode. Unless the target cell phone is in the ON/Active mode, the RFD devices are of no use for actually identifying the location of the device to a sufficient degree of certainty to support recovery by the Search Teams. However, when a cell phone is in the ON/Active mode, the PocketHound™ demonstrated 100-percent TAR with no false alarms. The search time averaged two minutes from the time the officers opened the cell door until they located an active phone concealed in a cardboard box. The directional accuracy was rated as Excellent by the evaluators for its ability to quickly lead them directly to the source of the RF signal. (See Exhibit 29.)

10.2.3. BVS, WolfHound Pro™. Like the Pocket Hound™, the WolfHound Pro™ performed flawlessly against ON/Active cell phone targets, but cannot detect cell phones in either the ON/Passive mode or the OFF mode. When a cell phone is in the ON/Active mode, the WolfHound Pro™ demonstrated 100-percent TAR with no false alarms. The search time averaged two minutes from the time the Search Team officers opened the cell door until they were able to locate an active phone concealed in a cardboard box. The directional accuracy was rated as Excellent by the evaluators for its ability to quickly lead them directly to the source of the RF signal. (See Exhibit 30.) The same caveats mentioned above about the PocketHound™ also apply to the WolfHound Pro™. That is, the RFD devices are of little use in actually recovering contraband cell phones unless the targets are in the ON/Active mode.

10.2.4. REI, Orion 2.4™. The Orion 2.4™ demonstrated a 94-percent overall TAR during the Cell Search Scenario Testing. This includes a mix of targets in the ON/Active, ON/Passive and OFF modes, designated in Exhibit 31 as TAR (All). Somewhat surprisingly, the device had a 100-percent TAR on targets concealed in peanut butter and wrapped in aluminum foil, but only an 83-percent TAR for targets hidden in cardboard

Exhibit 29. Cell Search Scenario Test Results – PocketHound™

Concealment Vessel Type	True Alarm Rate (On/Active) %	False Alarm Rate (AED) %	False Alarm Rate (Other) %	Found Phone %	Search Time (Minutes)	Directional Accuracy (0-5)*
Cardboard	100	0	0	100	2	5

*Directional Accuracy (0-5): 0=N/A, 1=POOR, 2=FAIR, 3=GOOD, 4=VERY GOOD, 5=EXCELLENT

Exhibit 30. Cell Search Scenario Test Results –WolfHound Pro™

Concealment Vessel Type	True Alarm Rate (On/Active) %	False Alarm Rate (AED) %	False Alarm Rate (Other) %	Found Phone %	Search Time (Minutes)	Directional Accuracy (0-5)*
Cardboard	100	0	0	100	2	5

Note: The Cell Search Scenario Tests involved target cell phones in the ON/Active mode only. The WolfHound Pro™ was not tested against, and cannot detect phones that are in the OFF mode.

*Directional Accuracy (0-5): 0=N/A, 1=POOR, 2=FAIR, 3=GOOD, 4=VERY GOOD, 5=EXCELLENT

boxes. Although the Orion 2.4™ was not expected to alert on a cell phone wrapped in aluminum foil, it did produce an indication that said "Corrosive" on the operator's display. This "Corrosive" indication was sufficient to alert the operators to further search aluminum foil targets and to locate the concealed cell phones. (See Exhibit 31.)

The Orion 2.4™ did produce a fairly high FAR for both AEDs and other non-electronic sources at 33 percent and 28 percent, respectively. Average search time was just over seven minutes from the time the officers entered the cell until they located the concealed cell phone. Evaluators rated the directional accuracy of the Orion 2.4™ as "Good." (See Exhibit 31.)

10.2.5. Summary Comparison of Cell Search Scenario Test Results. Exhibit 32 presents a side-by-side comparative summary of the Cell Search Scenario Test performance of all four hand-held cell phone detection devices. It should be noted that the TAR (All) column includes a mix of targets including those in the ON/Active, ON/Passive, OFF and Empty modes. As previously noted, the Cell Search Scenario Tests were

Exhibit 31. Cell Search Scenario Test Results – Orion 2.4™

Concealment Vessel Type	True Alarm Rate (ALL) %	False Alarm Rate (AED) %	False Alarm Rate (Other) %	Found Phone %	Search Time (Minutes)	Directional Accuracy (0-5)*
Cardboard	83	50	33	83	7	2
Peanut Butter Jar	100	50	50	100	7	3
Aluminum Foil	100	0	0	100	9	3
Overall[1]	94	33	28	94	7	3

*Directional Accuracy (0-5): 0=N/A, 1=POOR, 2=FAIR, 3=GOOD, 4=VERY GOOD, 5=EXCELLENT

abbreviated due to operational constraints; however, they were designed to give each hand-held cell phone detection device an opportunity to demonstrate its strength as determined by the Baseline Testing.

Exhibit 32 makes it appear as though the two RFD devices, the BVS PocketHound™ and the BVS WolfHound Pro™, performed the best, but this is only because they were tested against cell phones in the ON/Active mode. These devices are of little value for finding cell phones that are in the ON/Passive mode. They will provide a fleeting indication that there is RF energy in the area, but they are not useful for locating cell phones in this configuration. Neither device is capable of detecting a cell phone that is concealed in the OFF mode.

The BVS MantaRay™ demonstrated a relatively low TAR (56 percent) and an unacceptably high FAR (38 percent/AEDs and 76 percent/Other). It also had the longest average search time at nearly 10 minutes. The

directional accuracy of the device was rated as "Poor." (See Exhibit 32.)

The REI Orion 2.4™ performed better than the Manta-Ray™ with a 94-percent TAR and a lower FAR (33 percent/AEDs and 28 percent/Other). The Orion 2.4™ had a better average search time at just over seven minutes. It received a "Good" directional accuracy rating from the evaluators. (See Exhibit 32.)

Again, the reader is cautioned against making direct comparisons between dissimilar technology solutions when reviewing Exhibit 32 below. FMD and NLJD devices approach the problem of cell phone detection very differently than RFD devices. RFD device manufacturers only claim the capability of detecting cell phones that are ON. They stipulate that RFD devices are of no use in detecting cell phones that are OFF. FMD and NLJD device manufacturers claim to be able to detect cell phones whether they are ON or OFF. The choice of device must be driven by the concept of operations.

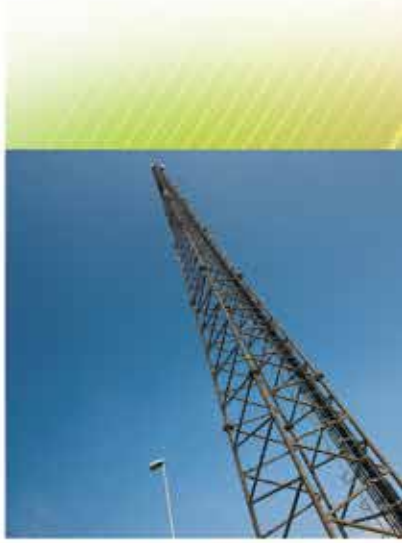
At the conclusion of the Operational Testing, all four hand-held cell phone detection devices were given to the SCI-Chester Search Team so that they could conduct an unscripted Operational Evaluation of the devices for 60 days. The results of the Operational Evaluation are presented below.

Exhibit 32. Summary Comparison of Cell Search Scenario Test Results

Device	True Alarm Rate (ALL) %	False Alarm Rate (AED) %	False Alarm Rate (Other) %	Found Phone %	Search Time (Minutes)	Directional Accuracy (0-5)*
MantaRay™ (FMD)	56	38	76	56	10	1
Orion 2.4™ (NLJD)	94	33	28	94	7	3
WolfHound Pro™ (RFD)	100	0	0	100	2	5
PocketHound™ (RFD)	100	0	0	100	2	5

Note: Overall results appear skewed in that the Cell Search Scenario tested the PocketHound's™ and the WolfHound Pro's™ ability to detect and locate target cell phones in the ON/Active mode only. These devices cannot detect phones that are in the OFF mode, whereas the Manta-Ray™ and the Orion 2.4™ can detect phones regardless of ON/OFF mode.

*Directional Accuracy (0-5): 0=N/A, 1=POOR, 2=FAIR, 3=GOOD, 4=VERY GOOD, 5=EXCELLENT



11. OPERATIONAL EVALUATION

Operational Evaluations were conducted by corrections officers over a period of 60 days. They were directed to use all four hand-held cell phone detection devices during the course of their daily duties. They were allowed to use their own discretion as to which devices they wanted to use on any given day. At the conclusion of the Operational Evaluation Period, the end users were asked to complete a survey (see Appendix S). The results of the survey are presented below.

The first set of questions was designed to measure how much time each officer spent using each device. As illustrated by the following charts, the amount of time spent using each device varied, but in general, the officers seem to have preferred using the two RFD devices (PocketHound™ and the WolfHound Pro™). See Exhibits 33-37.

Exhibit 33. Amount of Time Spent Using the MantaRay™

Q1 Please estimate how much time you spent using the Manta Ray.

Answered: 6 Skipped: 0

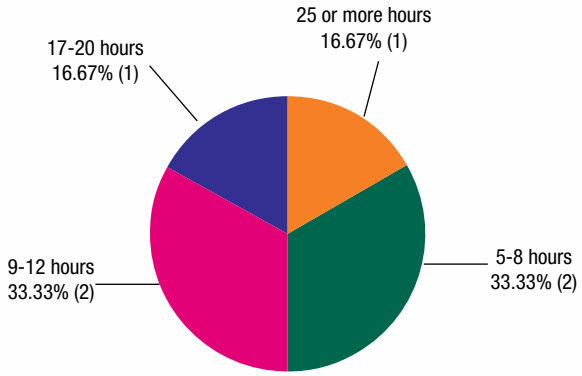


Exhibit 34. Amount of Time Spent Using the PocketHound™

Q2 Please estimate how much time you spent using PocketHound.

Answered: 6 Skipped: 0

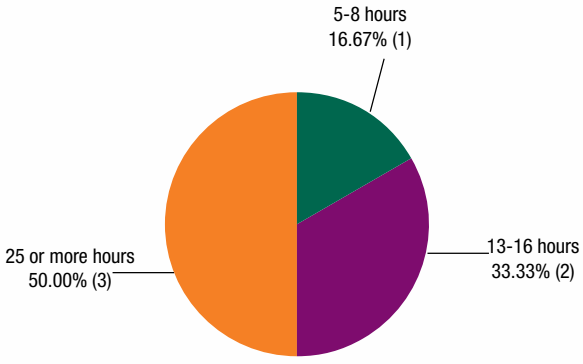


Exhibit 35. Amount of Time Spent Using the WolfHound Pro™

Q3 Please estimate how much time you spent using the WolfHound Pro.

Answered: 6 Skipped: 0

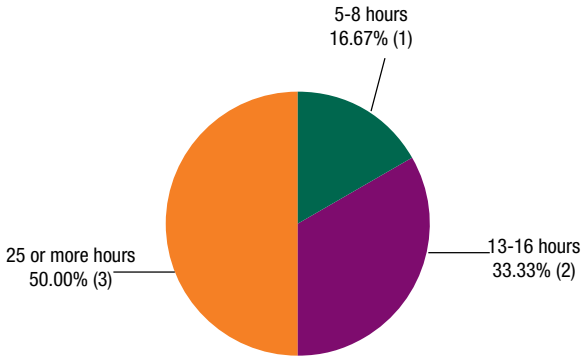


Exhibit 36. Amount of Time Spent Using the Orion 2.4™

Q4 Please estimate how much time you spent using the Orion 2.4.

Answered: 6 Skipped: 0

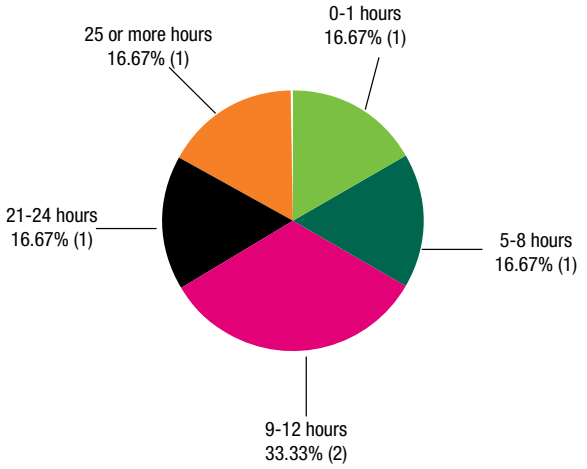


Exhibit 37 provides a side-by-side illustration of the estimated time that officers spent using each device. The choice of hand-held cell phone detection device was left to the discretion of each corrections officer. They were told that they could use any or all of these devices during the 60-day Operational Evaluation Period. They were free to select the device(s) that best served their operational mission and search procedure. The results show that the Search Team spent the most time using the two RF devices (PocketHound™ and WolfHound Pro™).

The corrections officers were asked to rank the durability of each device, considering how they thought the device would hold up to daily use in the corrections environment. Exhibits 38-41 and Exhibit 43 illustrate their rankings for each device on a five-point Likert Scale (1=Poor to 5=Excellent). The PocketHound™ was ranked as the most durable, while the Orion 2.4™ was ranked as the least durable.

The relatively low durability rating for the Orion 2.4™ was influenced by the fact that the device broke during Baseline Testing. Exhibit 42 is a photograph of the cracked plastic fitting on the telescopic handle. While it appeared to the end users that the fitting was cracked due to the stress on this fitting by the weight of the head-end unit of the device, the manufacturer's representative provided the following explanation via email on March 7, 2014:

> This is the first we time we have seen a break on this joint and have forwarded this to our engineers and production departments to evaluate. It's possible that we tightened the screw nearest the fracture too tight, stressing or cracking the material where it broke, or this could just be a weak spot that needs some re-enforcement. Regardless, we will look into it and evaluate ways to prevent in the future.

To the company's credit, REI replaced the entire Orion 2.4™ device via overnight delivery so that the testing could be completed. There was no further damage during the Operational Evaluation; however, one survey respondent noted: "The telescopic handle and big head wouldn't last long."

Exhibit 37. Estimated Amount of Time That Each Device Was Used (by # of Users)

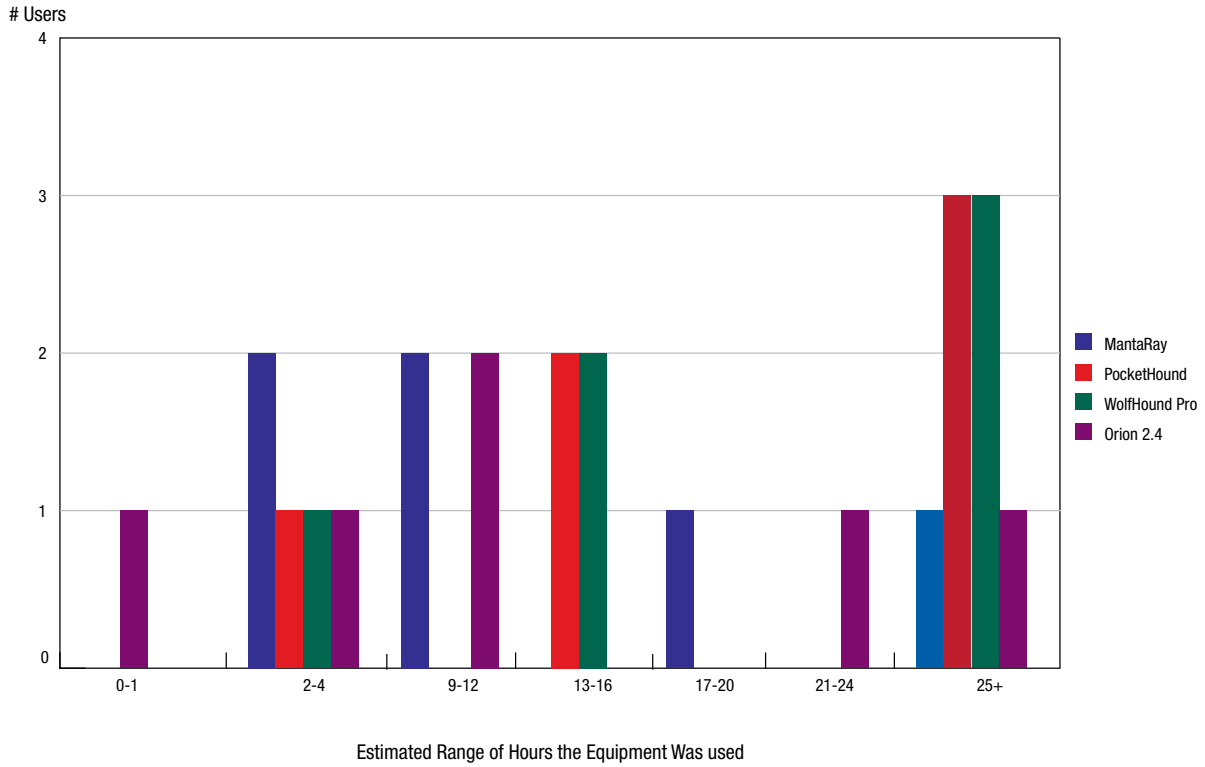


Exhibit 38. Durability Ranking of the MantaRay™

Q5 Please rank the durability of the MantaRay. Consider how you think this device will hold up to daily use in the corrections environment.

Answered: 6 Skipped: 0

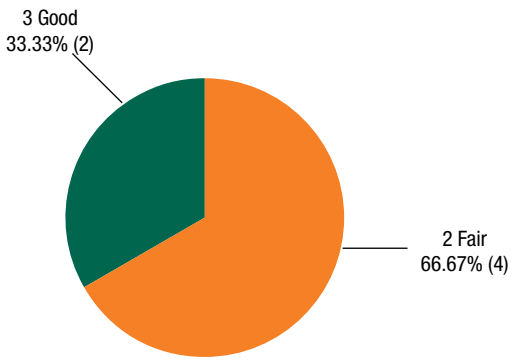


Exhibit 39. Durability Ranking of the PocketHound™

Q6 Please rank the durability of the PocketHound. Consider how you think this device will hold up to daily use in the corrections environment.

Answered: 6 Skipped: 0

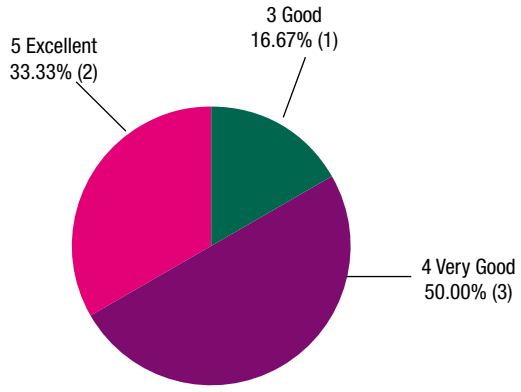


Exhibit 40. Durability Ranking of the WolfHound Pro™

Q7 Please rank the durability of the WolfHound Pro. Consider how you think this device will hold up to daily use in the corrections environment.

Answered: 6 Skipped: 0

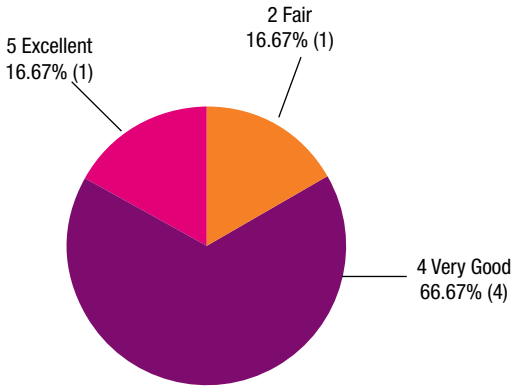


Exhibit 41. Durability Ranking of the Orion 2.4™

Q8 Please rank the durability of the Orion 2.4. Consider how you think this device will hold up to daily use in the corrections environment.

Answered: 6 Skipped: 0

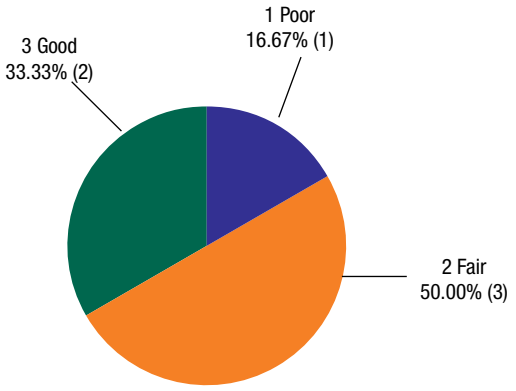


Exhibit 42. Photograph of the Cracked Plastic Fitting on the Orion 2.4™

Exhibit 43. Average Durability Ranking for Each Device

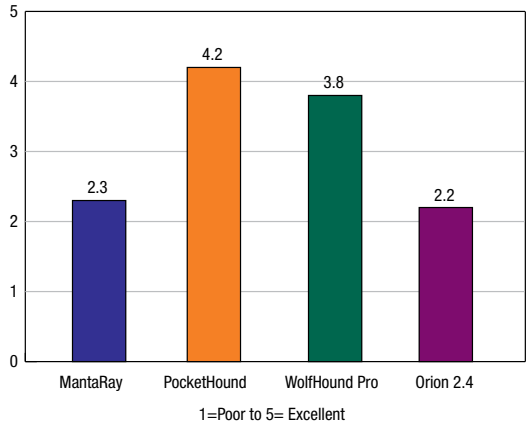


Exhibit 43 provides a side-by-side illustration of the average durability rankings that officers gave each device. The PocketHound™ and WolfHound Pro™ devices clearly emerged on top in this limited duration, subjective evaluation conducted over a 60-day Operational Evaluation Period. The corrections officers were asked to rank the user interface display of each device, considering how easy (or difficult) it is to interpret the alerts/displays that each device produces. Exhibits 44-47 illustrate their rankings for each device on a 5-point Likert Scale (1=Poor to 5=Excellent). The WolfHound Pro™ received the highest interface display ranking of the four devices.

Exhibit 44. User Interface Ranking for the MantaRay™

Q9 Please rank the user interface display of the MantaRay. Consider how easy (or difficult) it is to interpret the alerts/displays that the device produces.

Answered: 6 Skipped: 0

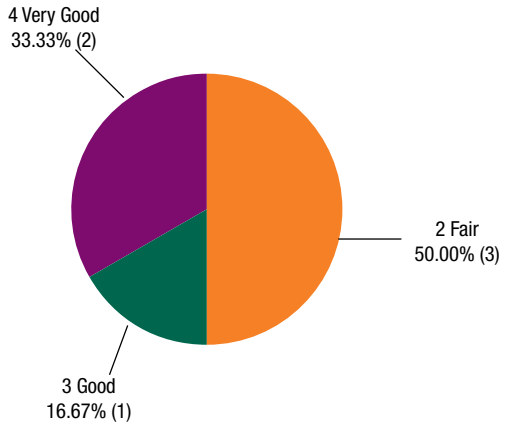


Exhibit 45. User Interface Ranking for the PocketHound™

Q10 Please rank the user interface display of the PocketHound. Consider how easy (or difficult) it is to interpret the alerts/displays that the device produces.

Answered: 6 Skipped: 0

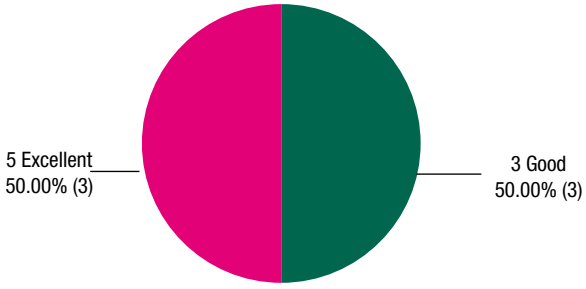


Exhibit 46. User Interface Ranking for the Wolfhound Pro™

Q11 Please rank the user interface display of the WolfHound Pro. Consider how easy (or difficult) it is to interpret the alerts/displays that the device produces.

Answered: 6 Skipped: 0

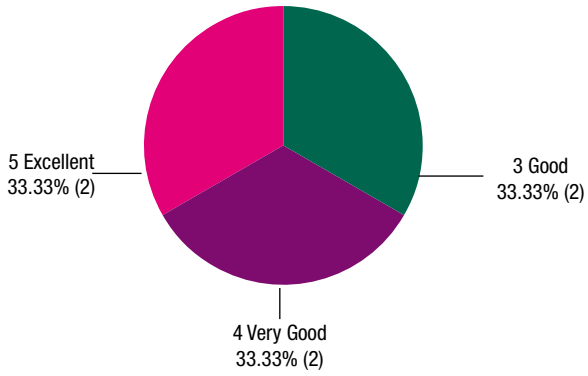


Exhibit 47. User Interface Ranking for the Orion 2.4™

Q12 Please rank the user interface display of the Orion 2.4. Consider how easy (or difficult) it is to interpret the alerts/displays that the device produces.

Answered: 6 Skipped: 0

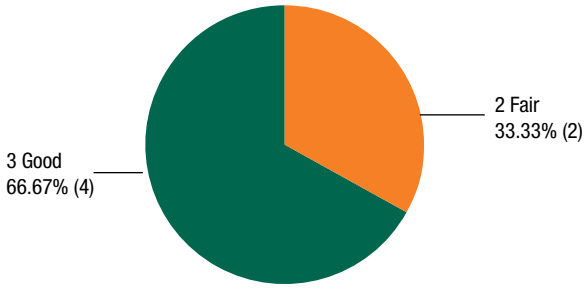
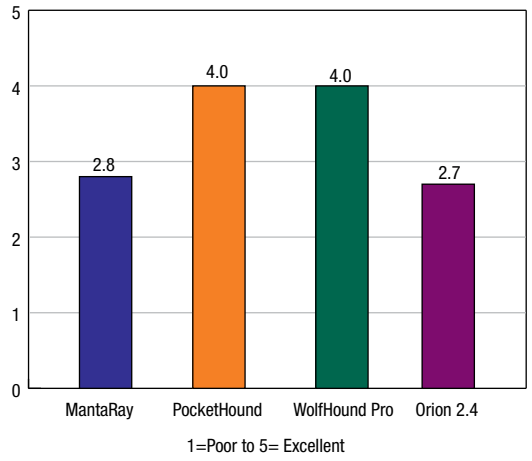


Exhibit 48 provides a side-by-side illustration of the average interface rankings that officers gave each device. The PocketHound™ and WolfHound Pro™ devices clearly emerged on top in this limited duration, subjective evaluation conducted over a 60-day Operational Evaluation Period..

Exhibit 48. Average Interface Ranking for Each Device



The corrections officers were asked to rank the ergonomics of each device, considering size, weight and user comfort level. Exhibits 49-53 illustrate their rankings for each device on a 5-point Likert Scale (1=Poor to 5=Excellent). The PocketHound™ received the highest ergonomic ranking of the four devices.

Exhibit 49. Ergonomic Ranking for the MantaRay™

Q13 Please rank the ergonomics of the MantaRay. Consider size, weight and user comfort level in your rating.

Answered: 6 Skipped: 0

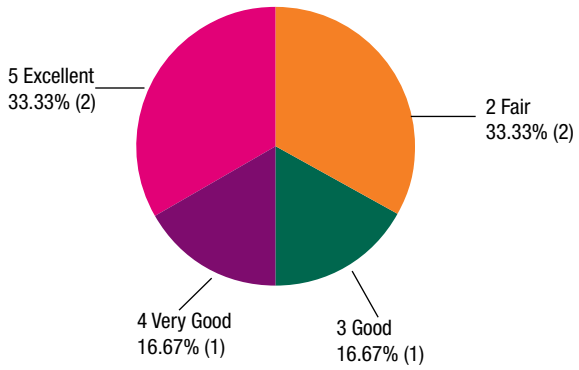


Exhibit 50. Ergonomic Ranking for the PocketHound™

Q14 Please rank the ergonomics of the PocketHound. Consider size, weight and user comfort level in your rating.

Answered: 6 Skipped: 0

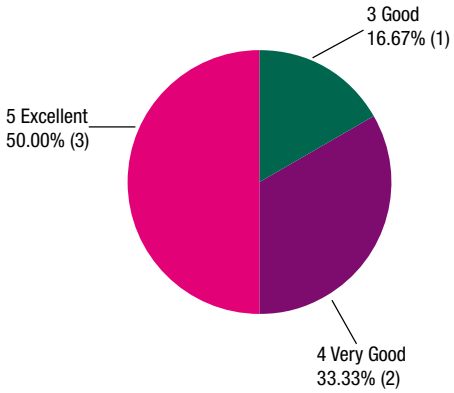


Exhibit 51. Ergonomic Ranking for the WolfHound Pro™

Q15 Please rank the ergonomics of the WolfHound Pro. Consider size, weight and user comfort level in your rating.

Answered: 6 Skipped: 0

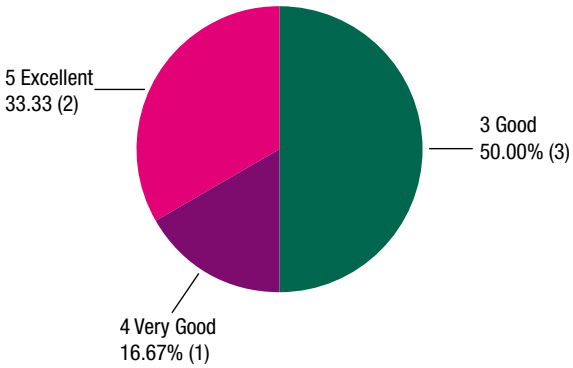


Exhibit 52. Ergonomic Ranking for the Orion 2.4™

Q16 Please rank the ergonomics of the Orion 2.4. Consider size, weight and user comfort level in your rating.

Answered: 6 Skipped: 0

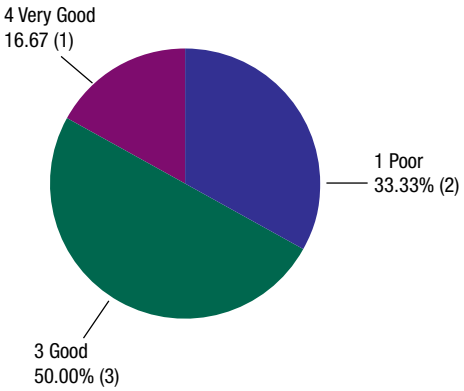
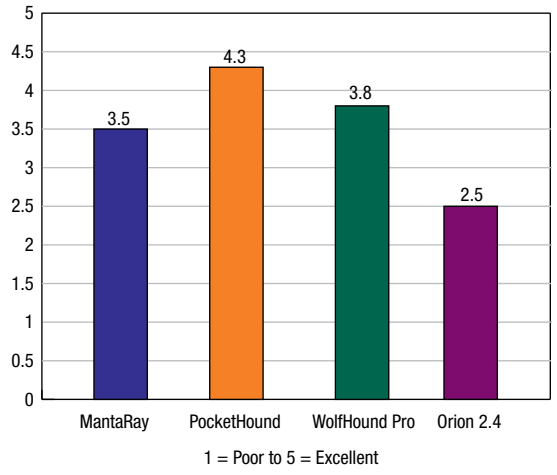


Exhibit 53 provides a side-by-side illustration of the average ergonomic rankings that officers gave each device. The PocketHound™ device scored the highest ergonomic ranking in this limited duration, subjective evaluation conducted over a 60-day Operational Evaluation Period.

Exhibit 53. Average Ergonomic Ranking for Each Device

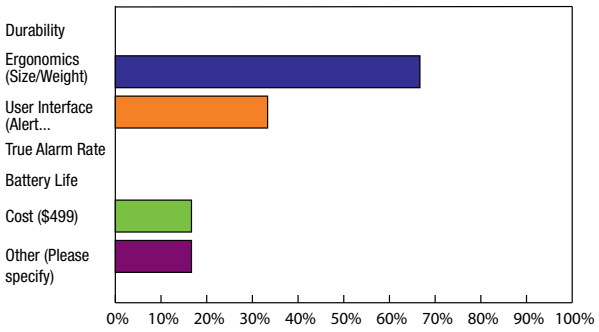


The end users were asked what features they liked about each device. They were offered the following choices: Durability, Ergonomics, User Interface, True Alarm Rate, Battery Life, Cost and Other. They were permitted to select as many features as they wanted. Exhibits 54-57 illustrate the features that they liked about each device.

Exhibit 54. Most Liked Features of the MantaRay™

Q17 What features do you like about the MantaRay device? (Choose all that apply).

Answered: 6 Skipped: 0

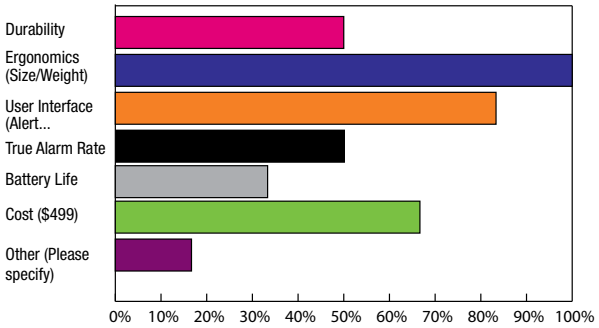


The comment that was submitted in reference to the "Other" response was: "Nothing." In other words, one user reported that there was nothing that he/she liked about the MantaRay™.

Exhibit 55. Most Liked Features of the PocketHound™

Q18 What features do you like about the PocketHound device? (Choose all that apply).

Answered: 6 Skipped: 0

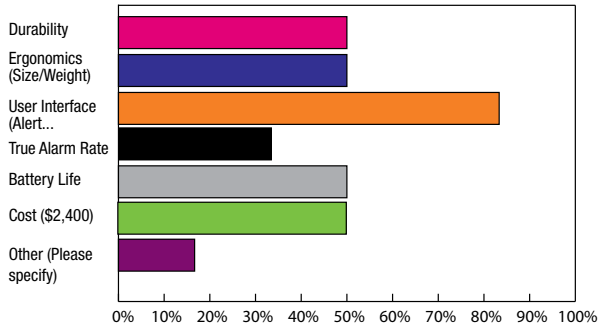


The comment that was submitted in reference to the "Other" response was: "… a nice piece of equipment … Cost effective when utilized with the WolfHound Pro."

Exhibit 56. Most Liked Features of the WolfHound Pro™

Q19 What features do you like about the WolfHound Pro device? (Choose all that apply).

Answered: 6 Skipped: 0

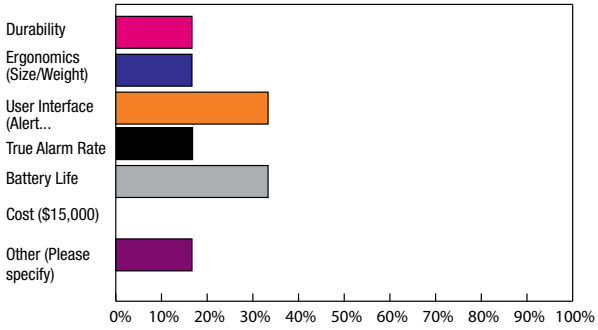


The comment that was submitted in reference to the "Other" response was: "… a nice piece of equipment … Cost effective when utilized with the PocketHound."

Exhibit 57. Most Liked Features of the Orion 2.4™

Q20 What features do you like about the Orion 2.4 device? (Choose all that apply).

Answered: 6 Skipped: 0



The comment that was submitted in reference to the "Other" response was: "Too time consuming and cost ineffective."

The end users were also asked what features they did not like about each device. They were offered the same choices: Durability, Ergonomics, User Interface, True Alarm Rate, Battery Life, Cost and Other. They were permitted to select as many features as they wanted. Exhibits 58-61 illustrate the features that they did not like about each device.

Exhibit 58. Features Not Liked About the MantaRay™

Q21 What features do you NOT like about the MantaRay device? (Choose all that apply).

Answered: 6 Skipped: 0

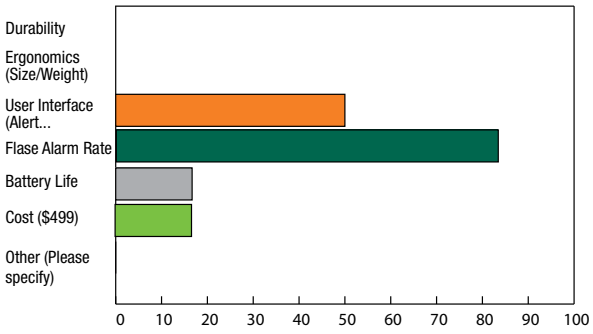
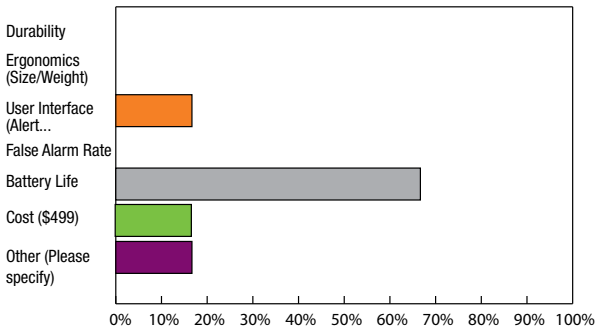


Exhibit 59. Features Not Liked About the PocketHound™

Q22 What features do you NOT like about the PocketHound device? (Choose all that apply).

Answered: 6 Skipped: 0

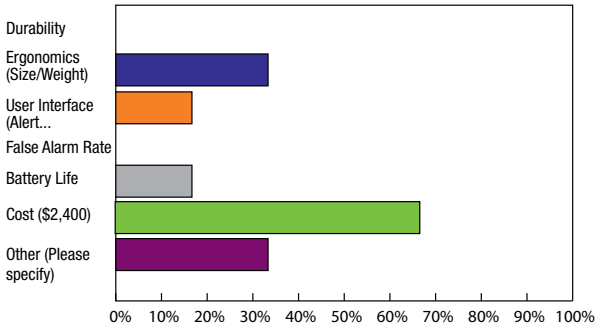


Clearly, the high FAR stands out as the feature that users did not like about the MantaRay™ device. As noted previously, the corrections officers were quickly frustrated by the numerous false alarms that served to hinder their cell search efforts.

Exhibit 60. Features Not Liked About the WolfHound Pro™

Q23 What features do you NOT like about the WolfHound Pro device? (Choose all that apply).

Answered: 6 Skipped: 0



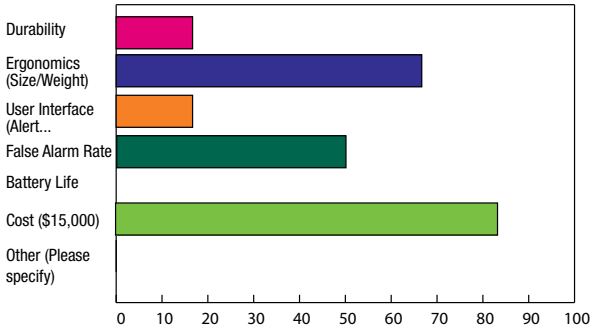
Battery life was cited most frequently as the feature that users did not like about the PocketHound™ device. The "Other" comment was not applicable to the question about what features the user did not like about the device. The comment was: "Once again a nice piece of equipment to have as a tool for finding cell phones."

Cost was the most frequently cited feature that users did not like about the WolfHound Pro™. There were two "Other" comments submitted. One was not applicable to the question about what features the user did not like about the device. The comment was: "Once again a nice piece of equipment to have as a tool for finding cell phones." The other comment was: "Could not get a true gauge on how far and how wide is the range being scanned. Our prison is next to a 24 hour casino."

Exhibit 61. Features Not Liked About the Orion 2.4™

Q24 What features do you NOT like about the Orion 2.4 device? (Choose all that apply).

Answered: 6 Skipped: 0



Cost, Ergonomics, and False Alarm Rate stand out as the features that users do not like about the Orion 2.4.™

Exhibit 62. Overall Rating of the MantaRay™

Q25 Please indicate your OVERALL RATING for the MantaRay. Consider durability, user interface display, ergonomics, features, reliability, effectiveness and cost in your rating.

Answered: 6 Skipped: 0

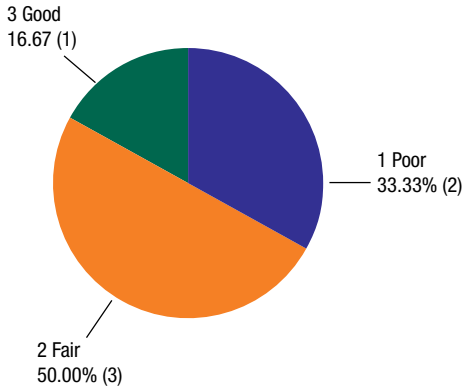


Exhibit 63. Overall Rating of the PocketHound™

Q26 Please indicate your OVERALL RATING for the PocketHound. Consider durability, user interface display, ergonomics, features, reliability, effectiveness and cost in your rating.

Answered: 6 Skipped: 0

Exhibit 64. Overall Rating of the WolfHound Pro™

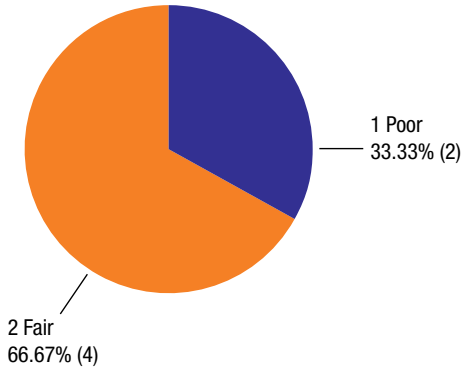
Q27 Please indicate your OVERALL RATING for the WolfHound Pro. Consider durability, user interface display, ergonomics, features, reliability, effectiveness and cost in your rating.

Answered: 6 Skipped: 0

Exhibit 65. Overall Rating of the Orion™

Q28 Please indicate your OVERALL RATING for the Orion. Consider durability, user interface display, ergonomics, features, reliability, effectiveness and cost in your rating.

Answered: 6 Skipped: 0



Users were asked to provide an overall rating for each device, considering durability, user interface display, ergonomics, features, reliability, effectiveness and cost. Exhibits 62-67 illustrate their rankings for each device on a 5-point Likert Scale (1=Poor to 5=Excellent). The PocketHound™ and the WolfHound Pro™ tied for the highest overall ranking of the four devices. The Orion 2.4™ received the lowest overall ranking.

Exhibit 66. Average Overall Rating for Each Device

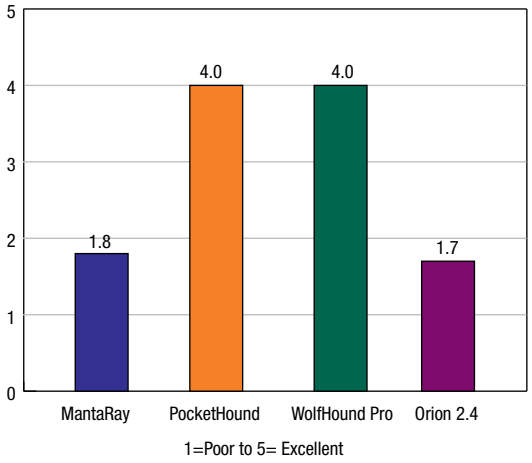


Exhibit 66 provides a side-by-side illustration of the average overall ratings that officers gave each device. The PocketHound™ and WolfHound Pro™ devices clearly emerged on top in this limited duration, subjective evaluation conducted over a 60-day Operational Evaluation Period.

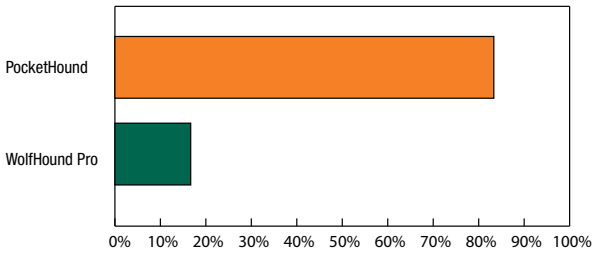
Users were asked the following question: Two of the hand-held cell phone detection devices are RFDs designed to work only when the target cell phone is ON (the PocketHound and the WolfHound Pro). Which of these two devices would you prefer to use to locate cell phones that are ON? Choose only one. Please explain your choice. Exhibit 67 illustrates the results.

Clearly, the PocketHound™ was the device of choice for locating cell phones that are ON. The following explanations were provided: "The PocketHound™ is the smallest (sic) of the two RFDs and as such makes it easier to conceal for use by an officer." "… easy to use, easy to conceal …" "… because of its' size and the ability to disguise the equipment." "… because of the size and cost."

Exhibit 67. Preferred Device for Cell Phones That Are On

Q29 Two of the hand-held cell phone detection devices are radio frequency detectors (RFDs) designed to only work when the target cell phone is "ON" (the PocketHound and the WolfHound Pro). Which of these two devices would you prefer to use to locate cell phones that are "ON"? Choose only once. Please explain your choice.

Answered: 6 Skipped: 0



Users were also asked the following question: "Two of the hand-held cell phone detection devices are designed to work whether the target cell phone is "ON" or "OFF" (the MantaRay™ and the Orion 2.4™). Which of these two devices would you prefer to use to locate cell phones that are "OFF"? Choose only one. Please explain your choice."

Exhibit 68 illustrates the results.

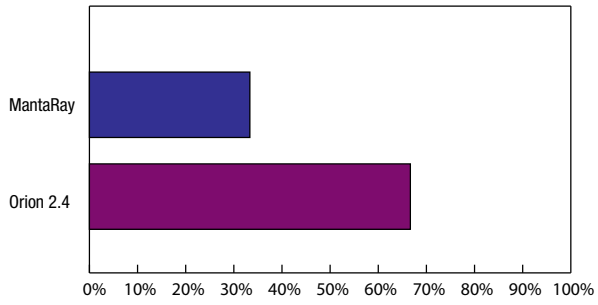
The Orion 2.4 was the device chosen by two-thirds of the users for locating cell phones that are OFF; however, the comments do not reflect a resounding endorsement. The following explanations were provided: "I would not like to use either of them." "Both devices give too many false readings, but if I had to choose only one for use in a corrections environment, I would go with the Orion 2.4 as it at least has the ability to be extended for use on ceilings and other areas not easily accessible."

The survey respondents were given the following Operational Scenario: *Assume that you receive credible intelligence from a reliable informant that there is a contraband cell phone in a specific inmate housing unit, but you don't know which inmate has it. You don't know whether the cell phone is currently "ON" or "OFF". You have access to all four hand-held cell phone detection devices (MantaRay™,*

Exhibit 68. Preferred Device for Cell Phones That Are Off

Q30 Two of the hand-held cell phone detection devices are radio frequency detectors (RFDs) designed to only work when the target cell phone is "ON" or "OFF" (the MantaRay ferromagnetic detector and the Orion 2.4 non-linear junction detector). Which of these two devices would you prefer to use to locate cell phones that are "OFF"? Choose only once. Please explain your choice.

Answered: 6 Skipped: 0



PocketHound™, WolfHound Pro™ and the Orion 2.4™). Which detection device (or combination of detection devices), would you choose to help you find the contraband cell phone? Please explain your answer.

Only one respondent indicated that he/she would choose the Orion 2.4™. That person noted, "The Orion would be the best bet for searching an inmate or his cell."

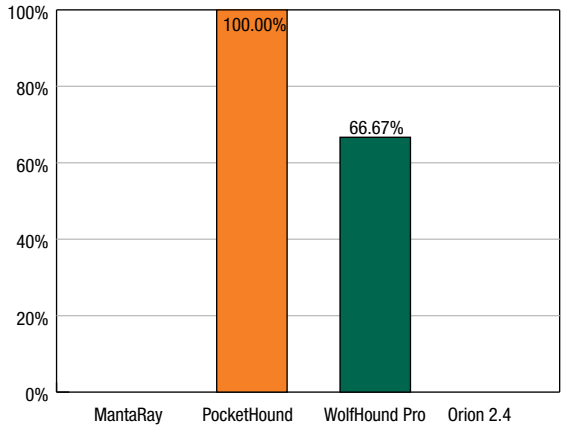
Every other respondent indicated that they would choose the PocketHound™ and the WolfHound Pro™. These officers commented, "… because they are the best two." "I would choose to use the PocketHound and the WolfHound Pro together over the course of a few days to target the area where the cell phone is being used. After narrowing down the suspected area, a thorough search of the cell or cells by hand would be most effective." "Prior practice teaches us that inmates after the evening lockdown will begin to utilize the phones if they have one. With prior knowledge, I can set up the WolfHound Pro to get information pertaining to when and what area it is being used. I can then have the PocketHound to help me locate it."

The corrections officers were also asked the question: *Assume that you have been given permission to purchase any of the four hand-held cell phone detection devices. Which device (or devices) would you buy and why? Choose all that apply.* Exhibit 69 illustrates the responses.

Exhibit 69. Which Device (or Devices) Would You Buy?

Q32 Assume that you have been given permission to purchase any of the four hand-held cell phone detection devices. Which device (or devices) would you buy and why? Choose all that apply.

Answered: 6 Skipped: 0



Every respondent (100 percent) indicated that he/she would select the PocketHound™. Two-thirds of the officers also indicated that they would purchase the WolfHound Pro™. Nobody indicated that they would purchase either the MantaRay™ or the Orion 2.4™. They commented that they would choose the two RFD devices for "Ease of use and range of detection." "Because they are compatible and give you a better chance of finding the phone." And because, "I like their capabilities together and by themselves."

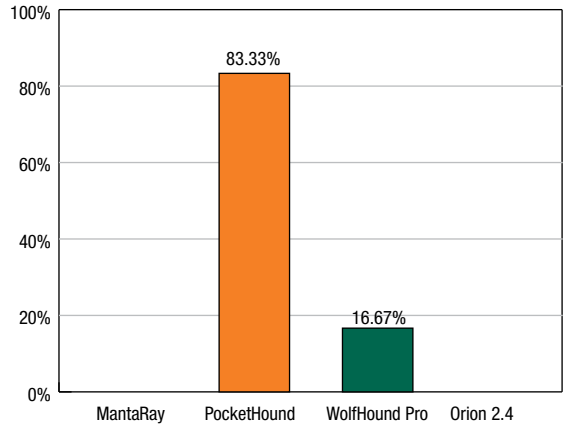
In an effort to further narrow down the device of choice, the corrections officers were asked to: *Assume that you have been given permission to purchase only one of the four hand-held cell phone detection devices. Which device would you buy and why?* Choose only one. Exhibit 70 illustrates the responses.

Eighty-three percent of the respondents indicated that they would choose to buy the PocketHound™. Only one officer indicated that he would buy the WolfHound Pro™. Nobody indicated that they would buy either the MantaRay™ or the Orion 2.4™.

Exhibit 70. Which ONE Device Would You Buy?

Q33 Assume that you have been given permission to purchase only one of the four hand-held cell phone detection devices. Which device would you buy and why? Choose only one.

Answered: 6 Skipped: 0



The corrections officers were asked if there is anything that could be done to improve the technology that would help them do their job more efficiently. They were asked, specifically, what features they would like to see in the ideal hand-held cell phone detection device.

They consistently responded that they would like to have "A device that picks up cell phones in both the ON and OFF modes." "Something that is smaller than the Orion 2.4 and more effective."

When given an opportunity to make any final comments, one respondent said: "The Orion 2.4 and the MantaRay provided too small of a scan area (i.e., detection range) for use in a corrections environment and had too many false alarms to make them effective tools. The Orion 2.4 was extremely expensive as well."

12. LIMITATIONS AND CONSIDERATIONS FOR FUTURE T&Es

The testing conducted by the CoE was performed to establish a foundational evaluation of hand-held cell phone detection devices in an operationally relevant correctional setting. Because of the constrained resources and schedule, there are some activities that could be modified or added given an opportunity to conduct a similar T&E in a more robust project environment. Below are some considerations for future T&Es of hand-held cell phone detection devices.

This T&E was limited to four specific devices. There are likely additional products that could be tested in the future. One vendor who initially expressed an interest in participating in this T&E dropped out because he could not secure FCC approval of his device prior to the start of the T&E. Another interested vendor dropped out and decided not to seek FCC approval. (See Section 4.2 for details.) Future T&Es should include all FCC-compliant (if applicable) hand-held cell phone detection devices that are on the market.

The number of evaluators for the operational evaluation was limited to six individuals. The T&E protocols were developed so that they might be replicated in future technology evaluations. Additional tests with a larger number of end users would be beneficial and would produce more robust results.

Due to logistical and schedule constraints, there were only a limited number of tests performed with each target/vessel/device combination. In addition, only a handful of the more common cell phone types and configurations could be tested. The cell phones that were used in the T&E are considered to be generally representative of the potential search targets found in a typical correctional facility. Given that there are more than 1,400 different makes/models of cell phones being manufactured today, more tests with more phone types would result in better statistical data. It is possible that other phone types may produce different results.

Additional testing should be done on the ability of the RFD devices to detect text messaging. This T&E relied on testing a simulated voice call with the target cell phones in the ON/Active mode. It is expected that the current technology would detect a text message signal, but it would probably be too short in duration to provide useful directional information. This was not empirically tested.

Future T&Es should include other concealment vessels besides the cardboard box, the concrete block, the aluminum foil and the peanut butter jar used in this initial effort. Inmates have been known to conceal contraband in some very ingenious ways. One specific suggestion made by the corrections officers at SCI-Chester was to seal a target cell phone in a plastic bag and conceal it in an inmate toilet. Cell toilets can be made of either porcelain or stainless steel. Both vessels should be tested in a future T&E.

The Baseline Testing was conducted in the close confines of an interior hallway with the target devices at the end of the hall. It was obvious that an alert indicated the user should continue to walk toward the known concealment vessels and target source. In some cases, the user received multiple alerts and some just happened to coincide with the moment the device was

in close proximity to the phone. In the much more open confines of a typical inmate housing unit, there is simply no way to obtain any reliable directional information from the device due to the intermittent nature of the "pings" that occur with a cell phone in ON/Passive mode. Future Baseline Testing should be done in a more open environment with concealment vessels and targets located at opposite points around the room. This might provide more opportunities for the RFD devices to demonstrate directional information from intermittent ON/Passive mode "pings" than were possible considering the constraints and user bias inherent with this linear testing site.

More analysis needs to be done on the frequency of the "pings" to a cell phone in ON/Passive (standby mode). An Internet search of the subject revealed a number of inconsistencies and a dearth of cogent information. It is likely that a trained user of the RFD devices could benefit from an understanding of how and when the "pings" occur. Perhaps the product manufacturers can further enhance their devices to capture and analyze the intermittent "pings" and develop an algorithm that would enable the devices to hone in on the target source, even when it is in standby mode.

Future product development on the FMD and NLJD devices should focus on reducing the number of false alarms. The relatively high FARs on these devices become a frustration to the end users as it slows down the search process without yielding a significant return in terms of contraband found. If a device proves to be unreliable and/or cumbersome to use, corrections officers will not use it.

Future T&Es should independently evaluate battery use (continuous operating time and re-charge time). The battery metrics reported herein were supplied by the manufacturers and were not independently verified. For the most part, the battery life on the units tested seemed to be sufficient. Users expressed some concern with the MantaRay™ device because it operates on a 9-volt battery and does not provide any indication of battery strength. On the first day of Operational Tests, the battery went dead without warning. After that experience, the Search Team officers learned to carry a spare battery with them. Ideally, the MantaRay™ device would have a battery strength indicator.

Hand-held cell phone detection devices that rely on operator judgment to interpret the user interface introduce the potential for operator bias. The ideal testing methodology would be to institute a double-blind test with randomized test scenarios. This would allow the operator to be ignorant of the target(s) or lack thereof. While every effort was made to control for this potential bias, it was clear to the corrections officers conducting the cell searches that there was a high probability that contraband cell phones were concealed in the cells that they were assigned to search. Likewise, during the Baseline Testing, although the officers did not know what type of target they were looking for nor in which concealment vessel it was hidden, they still knew that there was a good likelihood of finding a cell phone somewhere. This bias may have caused them to conduct more meticulous searches than they otherwise might have without the use of the technology. A second approach would be to conduct data collection and analysis independently, with the analyst unaware of the test conditions. Both approaches would require duplicate tests and additional logistical personnel, something that the CX CoE testing could not support.

It is also important to place the limitations of the testing in proper context. For example, during Baseline Testing, this T&E assumed equal weighting to all three modes of cell phones (i.e., ON/Active, ON/Passive and OFF). The Baseline Tests confirmed what was already known. RFD devices cannot detect cell phones unless they are ON. If locating concealed cell phones that are turned OFF is the highest operational priority, then RFD devices would not be considered (since it has been demonstrated and stipulated that RFD devices cannot detect cell phones in the OFF mode), even though they have great detection capability against ON/Active cell phones and were highly rated by the end users. If the concept of operations defines a requirement for detecting cell phones in the OFF position, then obviously, an FMD or NLJD device would be required, and the scope of future testing would be affected.

A more thorough cost/benefit analysis would be worthy of further exploration. It would be interesting, for example, to more thoroughly examine the metrics of contraband found, both with and without the benefit of technology. It is quite probable that experienced corrections officers conducting cell searches without benefit of technology may very well complete more cell searches in a given period, and in fact, may yield a higher rate of return (i.e., more contraband found in less time), than technology-equipped corrections officers who may be encumbered by the FAR and ergonomics of the devices. Controlled pre- and post-test performance measures, both with and without benefit of technology, would have to be established.

Planning and carrying out T&Es in an operationally relevant environment is challenging. Adaptations and field judgments have the potential to bias results. Unfortunately, this is the nature of field research. Onsite adaptation and flexibility are part of the process. That said, however, it is extremely valuable "to put technology to the test" in the practitioner environment: Let the end users use it.

In order to advance the field and to better serve the corrections community, a follow-on T&E effort involving more hand-held cell phone detection devices, more target cell phone types operating with different cell phone carriers, more concealment vessels, better controlled test environments, different prison designs (construction and configuration) and more practitioner involvement over a more extended period of operational use would be beneficial. It would also be beneficial to conduct a T&E on portable/transportable cell phone detection devices that did not meet the operational definition of "hand-held" devices used in this initiative.

This T&E demonstrated that different technologies approach the problem of detecting contraband cell phones in very different ways. RFD devices are highly effective in detecting and locating cell phones that are in ON/Active mode. They are of limited use against cell phones in the ON/Passive mode, and of no use when trying to locate a cell phone that is OFF. FMD and NLJD devices can locate contraband cell phones that are OFF; however, they are limited by their range and FAR. All of the hand-held cell phone detection devices that were tested have limitations. A multi-layered approach to combatting the problem of contraband cell phones in prisons (i.e., use of multiple technologies and ancillary operational enhancements), seems to be the best operational strategy: No current single technology "does it all."

13. SUMMARY

The Operational Evaluation produced results that are consistent with the results of the Baseline and Operational Tests. The two RFD devices (the PocketHound™ and the WolfHound Pro™) produce accurate indications of active cell phones in use. The end users expressed confidence in both devices while noting that they are limited to detecting and locating devices in the ON/Active mode.

The FMD device (the MantaRay™) and the NLJD device (the Orion 2.4™) did not fare as well during the evaluation. Even though they are both advertised as being capable of detecting and locating cell phones that are in either the ON or OFF modes, they both suffer from high FARs and extremely short detection distances. The end users had little confidence in either device.

Readers of this T&E report are cautioned against making direct comparisons between dissimilar technologies. FMD and NLJD devices approach the problem of cell phone detection very differently than RFD devices. RFD device manufacturers only claim the capability of detecting cell phones that are ON. They stipulate that RFD devices are of no use in detecting cell phones that are OFF. FMD and NLJD device manufacturers claim to be able to detect cell phones whether they are ON or OFF. The choice of device must be driven by the concept of operations.

It is important to understand the reality of the value of these proximity detectors. Correctional staff members are very adept at conducting physical cell searches; they are trained to systematically search an area and look for contraband of any size. If there is intelligence that an inmate has a cell phone, corrections officers should be able to find it during a random search with or without the technology. The same process would ensue and officers would do a thorough search (not just for the phone). If the search came up empty, then a handheld non-RFD device might be of some value. The point is: while these hand-held cell phone detection devices may help a corrections officer find a cell phone, they will never eliminate the need for a plain old, hands-on, manual search of an inmate's cell.

A "best practice" suggested by the Search Team officers would be to use the RFD devices during the period after the final evening count and before the oncoming shift change. In their experience, this is the window of opportunity that inmates use to make their cell phone calls. They also suggested using the devices from outside the cell block. Inmates who are using their cell phones in their cells will generally be watching for corrections officers making rounds on the interior tiers. They aren't likely to be watching outside the cell block. Both RFD devices demonstrated an ability to detect alerts through reinforced concrete walls. If officers could surreptitiously identify the cell with the cell phone from outside the cell block, they could use that information to conduct a targeted cell search inside.

Clearly, there is room for technological improvement in the hand-held cell phone detection device market. As noted by the end users who conducted the evaluation of the four devices that were the subject of this initiative, the ideal hand held cell phone detection device would be one that is capable of reliably detecting and locating cell phones in either the ON or OFF

modes, with a detection range greater than the current technology allows.

In closing, the CX CoE acknowledges that this T&E was limited to four specific devices, and the number of evaluators was limited to six individuals. The T&E protocols were developed so that they might be replicated in future technology evaluations. Additional tests with a larger number of end users, operating in different test environments, searching for more cell phone types/carriers, concealed in different concealment vessels, with an extended T&E period, would be beneficial and would produce more robust results. See additional recommendations for future technology T&E initiatives in Section 12.

APPENDIX A
BASELINE TEST PROTOCOLS

(Note: Due to programmatic, logistical, operational or technical factors, the CX CoE may change any or all tests, protocols, variables and/or methods without notice. The protocol detailed herein is for informational, reference and guidance purposes.)

Test Procedure

- Conduct tests in large room with all extraneous electronics and cell phones removed from the vicinity.
- Conduct each test once for each target/vessel. Active phones (ON/Active) and active AED/ON will not be tested in peanut butter jar or aluminum foil, since inmates do not generally conceal targets that are ON in these vessels and they would not be readily accessible for use.
- Order of tests is a random mix of all possible tests of which Operator 2 has no knowledge. (See Baseline Test script.)
- For cell phones in ON/Active mode, call an established number and leave the call active, with the outside receiving phone (not the target of the test) placed on mute. Once established, no sound should emanate from the test.
- Place target (or empty) into vessel (Operator 1). Operator 2 has no knowledge of target.
- Operator 2 starts test standing 20 feet away from vessel.
- Turn on device.
- Wait 10 seconds.
- Slowly walk toward vessel.
- End when the first noticeable true alarm is obtained on the device or when the device comes in contact with the vessel, whichever occurs first.
- Record distance when the alarm occurred or record No Detect if the device did not register a true alarm. To aid in recording measurements, the floor should be marked with one-foot increments for ease recording of distance, the last foot to be marked in one-inch increments.
- For cell phones in ON/Active mode, remove the phone from the vessel and confirm the call was active the entire test. If call is disengaged, discard results and repeat test.
- Power-Up Test: For tests involving cell phones in ON/Passive mode, operators are to perform a follow-up test:
  - Operator 2 returns to a distance of 20 feet with the detector device remaining on.
  - Operator 1 powers off the cell phone.
  - Operator 1 powers on the cell phone and immediately places it in the vessel as soon as the powering process starts.
  - Operator 2 records whether or not a true alarm is detected.
  - After one minute, if no alarm is detected, then a No Detect result is recorded.

Target [1]	Cardboard	Peanut Butter Jar	Aluminum Foil	Concrete Block	SUBTOTAL
Burner Phone CDMA – On/Active	YES	NO	NO	YES	2
Burner Phone CDMA – On/Passive	YES	YES	YES	YES	4
Burner Phone CDMA – Off	YES	YES	YES	YES	4
Burner Phone GSM – On/Active	YES	NO	NO	YES	2
Burner Phone GSM – ON/Passive	YES	YES	YES	YES	4
Burner Phone GSM – OFF	YES	YES	YES	YES	4
Smart Phone CDMA – ON/Active	YES	NO	NO	YES	2
Smart Phone CDMA – ON/Passive	YES	YES	YES	YES	4
Smart Phone CDMA – OFF	YES	YES	YES	YES	4
Smart Phone GSM – ON/Active	YES	NO	NO	YES	2
Smart Phone GSM – ON/Passive	YES	YES	YES	YES	4
Smart Phone GSM – OFF	YES	YES	YES	YES	4
Phone Accessories (All together in same box – charger, battery, SIM/ memory card, not plugged in)	YES	YES	YES	YES	4
AED – OFF (single representative devices either MP3 Player or hand-held radio)	YES	YES	YES	YES	4
AED – ON	YES	NO	NO	YES	2
Empty	YES	YES	YES	YES	4
Subtotal	**16**	**11**	**11**	**16**	**Total = 54**

[1] If Baseline Tests for all devices fail to detect phones in any given vessel, then that vessel will be removed from further testing.

Test Summary

Estimated time to conduct Baseline Tests:

- 16 Targets x 2 vessels (cardboard, concrete) = 32 tests.
- 11 Targets x 2 vessels (PB jar, aluminum foil) = 22 tests.
- Total# tests = 54 tests/device x 4 devices = 216 total tests.
- 216 TOTAL TESTS ÷ 10 days of testing = 21.6 tests/ day.

Outcomes

- Range of detection for each phone type/mode and vessel (inches/feet).
- Binary result for true alarm and false alarm for each target/vessel (Yes/No).
- Any devices that cannot detect phones > 10 feet away will not pass to Patrol Scenario Testing, but will be subjected to Cell Search Scenario Testing (Pass/ Fail). (See Appendix B.)
- If Baseline Tests for all devices fail to detect a specific Vessel+Target combination, then that Vessel+Target will be eliminated from further operational testing (Pass/Fail). (See Appendix B).

APPENDIX B
OPERATIONAL TEST PROTOCOLS

(Note: Due to programmatic, logistical, operational or technical factors, the CX CoE may change any or all tests, protocols, variables and/or methods without notice. The protocol detailed herein is for informational, reference and guidance purposes.)

Two scenarios (Patrol Scenario and Cell Search Scenario) are to be conducted during Operational Testing, in addition to evaluation feedback obtained from the use of the detectors during normal routine operations.

Patrol Scenario Testing

Questions to be Answered

- How does using a cell phone detector affect the time to conduct a routine patrol without any valid targets?
- Can the detector locate cell phones under various modes/vessels during patrol (True Alarm Rate, or TAR)?
- What are the False Alarm Rate (FAR) and frequency of False Alarms during patrol?

Test Procedures

2. Operator 1 plants vessel/target, Operator(s) 2-3 have no knowledge of what has been placed and in which cell. All target phones will be marked with tape for identification and inventory control purposes.
3. Order of tests is a random mix of all possible tests; Operator(s) 2-3 do not know the order of tests. (See test script at Appendix D.)
4. Conduct each test one time for each target/vessel and detector:
   - Based on available time and resources, the full test script for the Patrol Scenario may be repeated multiple times.
   - Any devices that cannot detect phones > 10 feet away (as established by Baseline Testing) will not participate in Patrol Scenario Testing, but will be subjected to Cell Search Scenario Testing (Pass/Fail).
   - Any devices that cannot detect phones that are OFF (as established by Baseline Testing) will only be tested against cell phone targets that are in ON/Active and ON/Passive modes (Pass/Fail).
   - If Baseline Tests for all devices fail to detect a specific Vessel+Target combination, then that Vessel+Target will not be included in Patrol Testing.
   - Phones in ON/Active or ON/Passive modes or AEDs (ON or OFF) will not be tested in the peanut butter jar or aluminum foil vessels, since inmates don't generally conceal phones that are ON in these vessels and there is no need for an inmate to conceal an AED.
   - Concrete vessels are **not** used in these tests. The cell wall construction serves as a natural concrete vessel.

- AEDs will not be "planted" or concealed in cells. Real world AEDs in possession of inmates will constitute organically occurring distracter targets that may occur in operational environment. If the device alerts on an inmate's AED, it will be noted.
- For cell phones in ON/Active Mode, call an established number and leave the call active, with the outside receiving phone (not the target of the test) placed on mute. Once established, no sound should emanate from the test target.
- For cell phones in ON/Passive Mode, turn the phone ON and leave it in standby mode.

5. Place vessels in cells in locations consistent with places inmates usually store similar items.
6. Operator(s) 2-3 walk patrol normally.
7. If a visual and/or audible alarm is indicated
   - Stop patrol.
   - Slowly survey and sweep in 360° circle while standing in place, move a couple feet in each direction to aid in location. Note the accuracy of any directional indication:
     - EXCELLENT [5] = Alarm originates from a single cell; device reports direction AND magnitude (or distance) to the target.
     - VERY GOOD [4] = Alarm originates from one of two cells; device reports direction AND magnitude (or distance) to the target.
     - GOOD [3] = Alarm originates from one of three cells; device reports direction OR magnitude (or distance) to the target.
     - FAIR [2] = Alarm originates from one of three cells; device does not report direction or magnitude.
     - POOR [1] = Alarm originates from one of five cells; device does not report direction or magnitude.
     - NOT APPLICABLE [0] = No alarm detected.
8. Operator(s) 2-3 pick a cell number or range of cell numbers (without entering the cell) that they believe houses the target based on device alarms and measurements.
9. Record after test:
   - Nature of each alarm – True, False (AED), False (Other).
   - True alarm detected - Yes/No (if applicable).
   - Correct cell identified by operator - Yes/No/Undetermined.
   - Time to walk patrol.

Vessels and Targets

Note:

- Any devices that cannot detect phones > 10 feet away (as established by Baseline Testing) will not participate in Patrol Scenario Testing.
- Any devices that cannot detect phones that are OFF (as established by Baseline Testing) will only be tested against cell phone targets that are in ON/Active and ON/Passive modes (Pass/Fail).
- If Baseline Tests for all devices fail to detect a specific Vessel+Target combination, then that Vessel+Target will not be included in Patrol Testing.

Target [1]	Cardboard	Peanut Butter Jar	Aluminum Foil	Concrete Block	SUBTOTAL
Burner Phone CDMA – On/Active	YES	NO	NO	NO	1
Burner Phone CDMA – On/Passive	YES	NO	NO	NO	1
Burner Phone CDMA – Off	MAYBE[2]	MAYBE[2]	MAYBE[2]	NO	0
Burner Phone GSM – On/Active	YES	NO	NO	NO	1
Burner Phone GSM – ON/Passive	YES	NO	NO	NO	1
Burner Phone GSM – OFF	MAYBE[2]	MAYBE[2]	MAYBE[2]	NO	0
Smart Phone CDMA – ON/Active	YES	NO	NO	NO	1
Smart Phone CDMA – ON/Passive	YES	NO	NO	NO	1
Smart Phone CDMA – OFF	MAYBE[2]	MAYBE[2]	MAYBE[2]	NO	0
Smart Phone GSM – ON/Active	YES	NO	NO	NO	1
Smart Phone GSM – ON/Passive	YES	NO	NO	NO	1
Smart Phone GSM – OFF	MAYBE[2]	MAYBE[2]	MAYBE[2]	NO	0
Phone Accessories (All together in same box – charger, battery, SIM/ memory card, not plugged in)	MAYBE[2]	MAYBE[2]	MAYBE[2]	NO	0
AED – OFF (single representative devices either MP3 Player or handheld radio)	NO	NO	NO	NO	0
AED – ON	NO	NO	NO	NO	0
Empty	YES	MAYBE[2]	MAYBE[2]	NO	1
Subtotal (Projected)	**9**	**0**	**0**	**0**	**TOTAL (Projected) = 9**

[1] If Baseline Tests for all devices fail to detect phones in any given vessel, then that vessel will be removed from further testing.

[2] These vessel/targets are not expected to pass the requirement of being detected farther than 10 feet away during baseline testing. This is based on basic understanding of the devices' technology. However, the test design allows for that possible outcome from baseline testing.

Test Summary

Estimated time to conduct Patrol Scenario Tests:

- 9 targets x 1 vessel (cardboard) = 9 tests/device x 2 devices[3] = 18 TOTAL TESTS x 2 (repeated)
- 36 TOTAL TESTS ÷ 20 days of testing = ~ 2 tests/ day

Based on available time and resources, the full test script for the Patrol Scenario may be repeated multiple times.

[3] Only the two RF receiver devices are expected to pass the baseline requirement of detecting cell phones > 10 feet away.

Outcomes

- For each detector:
  - Number of true and false alarms (AED, other and total) across target/vessel.
  - Accuracy of any directional indication for each alarm:
    - EXCELLENT [5] = Alarm originates from a single cell; device reports direction AND magnitude (or distance) to the target.
    - VERY GOOD [4] = Alarm originates from one of two cells; device reports direction AND magnitude (or distance) to the target.
    - GOOD [3] = Alarm originates from one of three cells; device reports direction OR magnitude (or distance) to the target.
    - FAIR [2] = Alarm originates from one of three cells; device does not report direction or magnitude.
    - POOR [1] = Alarm originates from one of five cells; device does not report direction or magnitude.

- NOT APPLICABLE [0] = No alarm detected.
- Time to walk the patrol.

Cell Search Scenario Testing

Questions to be Answered

- How does use of a cell phone detector affect the time to conduct a cell search?
- Frequency of False Alarms (AEDs) and False Alarms (Other) during cell search?
- Detection rate (TAR) in cell search with and without detector?

Test Procedures

1. Conduct cell search in accordance with standard facility procedures
2. Operator 1 plants vessel/object, Operator(s) 2-3 have no knowledge of what has been placed. All target phones are marked with tape for identification and inventory control purposes.
3. Order of tests is a random mix of all possible tests of which Operator 2 has no knowledge. (See test script at Appendix E.)
4. The vessel/object will be placed in an inmate's cell when the inmate is not present (e.g., when the inmates are at work, school or during recreational time).
5. Plant three vessels (cardboard box, peanut butter jar and aluminum foil) in all cells in all tests. Place the vessels in areas where inmates commonly place similar items, with the aluminum foil vessel concealed. For aluminum foil, use empty plastic cell phone case to simulate size. The targets will be placed in one of the three vessels prior to placement.
6. Concrete vessel NOT used in these tests.
7. Conduct each test one time for each target/vessel and detector.
   - For cell phones in ON/Active mode, call an established number and leave the call active, with the outside receiving phone (not the target of the test) placed on mute. Once established, no sound should emanate from the test target.
   - Phones in ON/Active or ON/Passive modes, or AEDs (ON or OFF) will not be tested in the peanut butter jar or aluminum foil vessels, since inmates do not generally conceal phones that are ON in these vessels and there is no need for an inmate to conceal an AED.
   - If Baseline Tests for all devices fail to detect a specific Vessel+Target combination, then that Vessel+Target will not be included in Cell Search Testing.
   - For cell phones in ON/Passive mode, turn the phone ON and leave it in standby mode.
8. On the inmate's return to the cell, the inmate will be informed of the cell search test:
   - A random cell search is being conducted as per standard facility procedures.
   - The cell search is part of a DOC technology evaluation project.
   - A dummy cell phone may or may not have been planted within the cell. The target has been marked with colored tape and its presence will have no impact on the inmate.
   - Any other contraband or issues discovered that are restricted or in violation of DOC policy will be treated as usual and will result in standard responses or disciplinary action.
9. On initiating the cell search, the operator will perform a slow overview sweep of the cell, furniture and belongings without handling or disrupting items.
10. Perform a detailed search (as per standard facility procedures). After completing the hand search to his/her satisfaction, the operator will sweep each area/object slowly a final time with the hand-held cell phone detection device before proceeding to the next cell search.
11. Record:
    - Time to conduct the cell search (minutes).
    - Number of alarms and whether linked to phone or AED or false reading.
    - Found phone? Yes/No.
    - Accuracy of any directional information:
      - EXCELLENT [5] = Operator is alerted of a target immediately on beginning search; provides magnitude (or distance) to the target that is sensitive to one inch.

- VERY GOOD [4] = Operator is alerted of a target immediately on beginning search; provides magnitude (or distance) to the target that is sensitive to one foot.
- GOOD [3] = During search, provides simple alarm within one foot of target; device reports magnitude (or distance) on alarm.
- FAIR [2] = During search, provides simple alarm within one foot of target; No magnitude (or distance) provided.
- POOR [1] = Alarm position within cell unavailable; Device cannot specify location of target within the cell.
- NOT APPLICABLE [0] = No alarm detected.

Vessels and Targets

Note:

- Phones in ON/Active or ON/Passive modes or AEDs (ON or OFF) will not be tested in the peanut butter jar or aluminum foil vessels since inmates do not generally conceal phones that are ON in these vessels and there is no need for an inmate to conceal an AED.
- If Baseline Tests for all devices fail to detect a specific Vessel+Target combination, then that Vessel+Target will not be included in Cell Search Testing.

Target [1]	Cardboard Box	Peanut Butter Jar	Aluminum Foil	Concrete Block	Subtotal
Burner Phone CDMA – On/Active	YES	NO	NO	NO	1
Burner Phone CDMA – On/Passive	YES	NO	NO	NO	1
Burner Phone CDMA – Off	YES	YES	YES	NO	3
Burner Phone GSM – On/Active	YES	NO	NO	NO	1
Burner Phone GSM – ON/Passive	YES	NO	NO	NO	1
Burner Phone GSM – OFF	YES	YES	YES	NO	3
Smart Phone CDMA – ON/Active	YES	NO	NO	NO	1
Smart Phone CDMA – ON/Passive	YES	NO	NO	NO	1
Smart Phone CDMA – OFF	YES	YES	YES	NO	3
Smart Phone GSM – ON/Active	YES	NO	NO	NO	1
Smart Phone GSM – ON/Passive	YES	NO	NO	NO	1
Smart Phone GSM – OFF	YES	YES	YES	NO	3
Phone Accessories (All together in same box – charger, battery, SIM/ memory card, not plugged in)	YES	YES	YES	NO	3
AED – OFF (single representative devices either MP3 Player or hand-held radio)	NO	NO	NO	NO	0
AED – ON	NO	NO	NO	NO	0
Empty	YES	YES	YES	NO	3
Subtotal	**14**	**6**	**6**	**0**	**TOTAL = 26**

[1] If Baseline Tests for all devices fail to detect phones in any given vessel, then that vessel will be removed from further testing.

Test Summary

Estimated time to conduct Cell Search Tests:

- 14 Targets x 1 vessel (cardboard) = 14 tests.
- 6 Targets x 2 vessels (peanut butter jar, aluminum foil) = 12 tests.
- Total# tests = 26 tests/device x 4 devices = 104 total tests with devices.
- A set of cell searches without using any hand-held cell phone detector device as a control:
  - 3 targets (2 physical phone types, empty) x 3 vessels x 2 tests = 18 cell searches.
- 104 device tests + 18 control tests = 122 total tests.
- 122 total tests ÷ 20 days of testing = 6.1 tests/day.

Outcomes

- Average time to conduct cell search with and without detector(s) (minutes).
- Frequency of False Alarm (AED), False Alarm (Other), and False Alarm (Total) during cell search.
- Detection rate (TAR) in cell search with and without detector.

Summary of All Tests

- Baseline Testing
  - 216 total tests ÷ 10 days of testing = ~22 tests/day.
- Operational Testing
  - Projected testing workshare based on projected vessel/targets and devices to pass Operational Testing requirements.
  - Patrol Scenario
- 36 total tests ÷ 20 days of testing = ~2 tests/day.
  - Cell Search Scenario
- 122 total tests ÷ 20 days of testing = ~6 tests/day.

Required Inventory

- 2 - CDMA burner phones.
- 2 - GSM burner phones.
- 2 - CDMA smart phones.
- 2 - GSM smart phones.
- 4 – CDMA carrier pre-paid phone minute cards (500 minutes each).
- 4 – GSM carrier pre-paid phone minute cards (500 minutes each).
- 2 – phone chargers.
- 2 – phones with internal parts removed (shell cases).
- 2 – SIM cards.
- 2 – AEDs.
- 3 - 8-inch cement blocks.
- 3 – standard cardboard records boxes (same brand as sold in commissary).
- 3 – Jars of peanut butter (same brand as sold in commissary).
- 1 – 100-foot roll of aluminum foil.
- 1 – 50-foot tape measure.
- 1 – 25-yard roll of ¾" masking tape.
- Pens.
- Paper.
- Digital camera to record test environments, phone equipment and vessels.

APPENDIX C
BASELINE TEST SCRIPT

Key to Test Script Abbreviations

Target	Abbreviation
Burner CDMA (ON/Active)	BCDMAOA
Burner CDMA (ON/Passive)*	BCDMAOP
Burner CDMA (OFF)	BCDMAOFF
Burner GSM (ON/Active)	BGSMOA
Burner GSM (ON/Passive)*	BGSMOP
Burner GSM (OFF)	BGSMOFF
Smart CDMA (ON/Active)	SCDMAOA
Smart CDMA (ON/Passive)*	SCDMAOP
Smart CDMA (OFF)	SCDMAOFF
Smart GSM (ON/Active)	SGSMOA
Smart GSM (ON/Passive)*	SGSMOP
Smart GSM (OFF)	SGSMOFF
Phone Accessories	Accessories
AED (ON/Passive)	AED ON
AED (OFF)	AED OFF
Empty (No Target)	EMPTY

* Reminder: Includes Power-On Test

Baseline Tests

√	Test #	Device A	Target	Vessel	Comments
√	1	BV, MantaRay	BCDMAOA	Cardboard	
√	2	BV, MantaRay	BCDMAOP	Cardboard	
√	3	BV, MantaRay	BCDMAOFF	Cardboard	
√	4	BV, MantaRay	BGSMOA	Cardboard	
√	5	BV, MantaRay	BGSMOP	Cardboard	
√	6	BV, MantaRay	BGSMOFF	Cardboard	
√	7	BV, MantaRay	SCDMAOA	Cardboard	
√	8	BV, MantaRay	SCDMAOP	Cardboard	
√	9	BV, MantaRay	SCDMAOFF	Cardboard	
√	10	BV, MantaRay	SGSMOA	Cardboard	
√	11	BV, MantaRay	SGSMOP	Cardboard	
√	12	BV, MantaRay	SGSMOFF	Cardboard	
√	13	BV, MantaRay	Accessories	Cardboard	
√	14	BV, MantaRay	AED ON	Cardboard	
√	15	BV, MantaRay	AED OFF	Cardboard	
√	16	BV, MantaRay	EMPTY	Cardboard	

√	Test #	Device B	Target	Vessel	Comments
√	17	BV, PocketHound	BCDMAOA	Cardboard	
√	18	BV, PocketHound	BCDMAOP	Cardboard	
√	19	BV, PocketHound	BCDMAOFF	Cardboard	
√	20	BV, PocketHound	BGSMOA	Cardboard	
√	21	BV, PocketHound	BGSMOP	Cardboard	
√	22	BV, PocketHound	BGSMOFF	Cardboard	
√	23	BV, PocketHound	SCDMAOA	Cardboard	
√	24	BV, PocketHound	SCDMAOP	Cardboard	
√	25	BV, PocketHound	SCDMAOFF	Cardboard	
√	26	BV, PocketHound	SGSMOA	Cardboard	
√	27	BV, PocketHound	SGSMOP	Cardboard	
√	28	BV, PocketHound	SGSMOFF	Cardboard	
√	29	BV, PocketHound	Accessories	Cardboard	
√	30	BV, PocketHound	AED ON	Cardboard	
√	31	BV, PocketHound	AED OFF	Cardboard	
√	32	BV, PocketHound	EMPTY	Cardboard	

√	Test #	Device C	Target	Vessel	Comments
√	33	BV, WolfHoundPro	BCDMAOA	Cardboard	
√	34	BV, WolfHoundPro	BCDMAOP	Cardboard	
√	35	BV, WolfHoundPro	BCDMAOFF	Cardboard	
√	36	BV, WolfHoundPro	BGSMOA	Cardboard	
√	37	BV, WolfHoundPro	BGSMOP	Cardboard	
√	38	BV, WolfHoundPro	BGSMOFF	Cardboard	
√	39	BV, WolfHoundPro	SCDMAOA	Cardboard	
√	40	BV, WolfHoundPro	SCDMAOP	Cardboard	
√	41	BV, WolfHoundPro	SCDMAOFF	Cardboard	
√	42	BV, WolfHoundPro	SGSMOA	Cardboard	
√	43	BV, WolfHoundPro	SGSMOP	Cardboard	
√	44	BV, WolfHoundPro	SGSMOFF	Cardboard	
√	45	BV, WolfHoundPro	Accessories	Cardboard	
√	46	BV, WolfHoundPro	AED ON	Cardboard	
√	47	BV, WolfHoundPro	AED OFF	Cardboard	
√	48	BV, WolfHoundPro	EMPTY	Cardboard	

√	Test #	Device E	Target	Vessel	Comments
√	49	REI, Orion 2.4	BCDMAOA	Cardboard	
√	50	REI, Orion 2.4	BCDMAOP	Cardboard	
√	51	REI, Orion 2.4	BCDMAOFF	Cardboard	
√	52	REI, Orion 2.4	BGSMOA	Cardboard	
√	53	REI, Orion 2.4	BGSMOP	Cardboard	
√	54	REI, Orion 2.4	BGSMOFF	Cardboard	
√	55	REI, Orion 2.4	SCDMAOA	Cardboard	
√	56	REI, Orion 2.4	SCDMAOP	Cardboard	
√	57	REI, Orion 2.4	SCDMAOFF	Cardboard	
√	58	REI, Orion 2.4	SGSMOA	Cardboard	
√	59	REI, Orion 2.4	SGSMOP	Cardboard	
√	60	REI, Orion 2.4	SGSMOFF	Cardboard	
√	61	REI, Orion 2.4	Accessories	Cardboard	
√	62	REI, Orion 2.4	AED ON	Cardboard	
√	63	REI, Orion 2.4	AED OFF	Cardboard	
√	64	REI, Orion 2.4	EMPTY	Cardboard	

√	Test #	Device A	Target	Vessel	Comments
√	65	BV, MantaRay	BCDMAOA	Concrete	
√	66	BV, MantaRay	BCDMAOP	Concrete	
√	67	BV, MantaRay	BCDMAOFF	Concrete	
√	68	BV, MantaRay	BGSMOA	Concrete	
√	69	BV, MantaRay	BGSMOP	Concrete	
√	70	BV, MantaRay	BGSMOFF	Concrete	
√	71	BV, MantaRay	SCDMAOA	Concrete	
√	72	BV, MantaRay	SCDMAOP	Concrete	
√	73	BV, MantaRay	SCDMAOFF	Concrete	
√	74	BV, MantaRay	SGSMOA	Concrete	
√	75	BV, MantaRay	SGSMOP	Concrete	
√	76	BV, MantaRay	SGSMOFF	Concrete	
√	77	BV, MantaRay	Accessories	Concrete	
√	78	BV, MantaRay	AED ON	Concrete	
√	79	BV, MantaRay	AED OFF	Concrete	
√	80	BV, MantaRay	EMPTY	Concrete	

√	Test #	Device B	Target	Vessel	Comments
√	81	BV, PocketHound	BCDMAOA	Concrete	
√	82	BV, PocketHound	BCDMAOP	Concrete	
√	83	BV, PocketHound	BCDMAOFF	Concrete	
√	84	BV, PocketHound	BGSMOA	Concrete	
√	85	BV, PocketHound	BGSMOP	Concrete	
√	86	BV, PocketHound	BGSMOFF	Concrete	
√	87	BV, PocketHound	SCDMAOA	Concrete	
√	88	BV, PocketHound	SCDMAOP	Concrete	
√	89	BV, PocketHound	SCDMAOFF	Concrete	
√	90	BV, PocketHound	SGSMOA	Concrete	
√	91	BV, PocketHound	SGSMOP	Concrete	
√	92	BV, PocketHound	SGSMOFF	Concrete	
√	93	BV, PocketHound	Accessories	Concrete	
√	94	BV, PocketHound	AED ON	Concrete	
√	95	BV, PocketHound	AED OFF	Concrete	
√	96	BV, PocketHound	EMPTY	Concrete	

√	Test #	Device C	Target	Vessel	Comments
√	97	BV, WolfHoundPro	BCDMAOA	Concrete	
√	98	BV, WolfHoundPro	BCDMAOP	Concrete	
√	99	BV, WolfHoundPro	BCDMAOFF	Concrete	
√	100	BV, WolfHoundPro	BGSMOA	Concrete	
√	101	BV, WolfHoundPro	BGSMOP	Concrete	
√	102	BV, WolfHoundPro	BGSMOFF	Concrete	
√	103	BV, WolfHoundPro	SCDMAOA	Concrete	
√	104	BV, WolfHoundPro	SCDMAOP	Concrete	
√	105	BV, WolfHoundPro	SCDMAOFF	Concrete	
√	106	BV, WolfHoundPro	SGSMOA	Concrete	
√	107	BV, WolfHoundPro	SGSMOP	Concrete	
√	108	BV, WolfHoundPro	SGSMOFF	Concrete	
√	109	BV, WolfHoundPro	Accessories	Concrete	
√	110	BV, WolfHoundPro	AED ON	Concrete	
√	111	BV, WolfHoundPro	AED OFF	Concrete	
√	112	BV, WolfHoundPro	EMPTY	Concrete	

√	Test #	Device E	Target	Vessel	Comments
√	113	REI, Orion 2.4	BCDMAOA	Concrete	
√	114	REI, Orion 2.4	BCDMAOP	Concrete	
√	115	REI, Orion 2.4	BCDMAOFF	Concrete	
√	116	REI, Orion 2.4	BGSMOA	Concrete	
√	117	REI, Orion 2.4	BGSMOP	Concrete	
√	118	REI, Orion 2.4	BGSMOFF	Concrete	
√	119	REI, Orion 2.4	SCDMAOA	Concrete	
√	120	REI, Orion 2.4	SCDMAOP	Concrete	
√	121	REI, Orion 2.4	SCDMAOFF	Concrete	
√	122	REI, Orion 2.4	SGSMOA	Concrete	
√	123	REI, Orion 2.4	SGSMOP	Concrete	
√	124	REI, Orion 2.4	SGSMOFF	Concrete	
√	125	REI, Orion 2.4	Accessories	Concrete	
√	126	REI, Orion 2.4	AED ON	Concrete	
√	127	REI, Orion 2.4	AED OFF	Concrete	
√	128	REI, Orion 2.4	EMPTY	Concrete	

√	Test #	Device A	Target	Vessel	Comments
√	129	BV, MantaRay	BCDMAOP	Peanut Butter Jar	
√	130	BV, MantaRay	BCDMAOFF	Peanut Butter Jar	
√	131	BV, MantaRay	BGSMOP	Peanut Butter Jar	
√	132	BV, MantaRay	BGSMOFF	Peanut Butter Jar	
√	133	BV, MantaRay	SCDMAOP	Peanut Butter Jar	
√	134	BV, MantaRay	SCDMAOFF	Peanut Butter Jar	
√	135	BV, MantaRay	SGSMOP	Peanut Butter Jar	
√	136	BV, MantaRay	SGSMOFF	Peanut Butter Jar	
√	137	BV, MantaRay	Accessories	Peanut Butter Jar	
√	138	BV, MantaRay	AED OFF	Peanut Butter Jar	
√	139	BV, MantaRay	EMPTY	Peanut Butter Jar	

√	Test #	Device B	Target	Vessel	Comments
√	140	BV, PocketHound	BCDMAOP	Peanut Butter Jar	
√	141	BV, PocketHound	BCDMAOFF	Peanut Butter Jar	
√	142	BV, PocketHound	BGSMOP	Peanut Butter Jar	
√	143	BV, PocketHound	BGSMOFF	Peanut Butter Jar	
√	144	BV, PocketHound	SCDMAOP	Peanut Butter Jar	
√	145	BV, PocketHound	SCDMAOFF	Peanut Butter Jar	
√	146	BV, PocketHound	SGSMOP	Peanut Butter Jar	
√	147	BV, PocketHound	SGSMOFF	Peanut Butter Jar	
√	148	BV, PocketHound	Accessories	Peanut Butter Jar	
√	149	BV, PocketHound	AED OFF	Peanut Butter Jar	
√	150	BV, PocketHound	EMPTY	Peanut Butter Jar	

√	Test #	Device C	Target	Vessel	Comments
√	151	BV, WolfHoundPro	BCDMAOP	Peanut Butter Jar	
√	152	BV, WolfHoundPro	BCDMAOFF	Peanut Butter Jar	
√	153	BV, WolfHoundPro	BGSMOP	Peanut Butter Jar	
√	154	BV, WolfHoundPro	BGSMOFF	Peanut Butter Jar	
√	155	BV, WolfHoundPro	SCDMAOP	Peanut Butter Jar	
√	156	BV, WolfHoundPro	SCDMAOFF	Peanut Butter Jar	
√	157	BV, WolfHoundPro	SGSMOP	Peanut Butter Jar	
√	158	BV, WolfHoundPro	SGSMOFF	Peanut Butter Jar	
√	159	BV, WolfHoundPro	Accessories	Peanut Butter Jar	
√	160	BV, WolfHoundPro	AED OFF	Peanut Butter Jar	
√	161	BV, WolfHoundPro	EMPTY	Peanut Butter Jar	

√	Test #	Device E	Target	Vessel	Comments
√	162	REI, Orion 2.4	BCDMAOP	Peanut Butter Jar	
√	163	REI, Orion 2.4	BCDMAOFF	Peanut Butter Jar	
√	164	REI, Orion 2.4	BGSMOP	Peanut Butter Jar	
√	165	REI, Orion 2.4	BGSMOFF	Peanut Butter Jar	
√	166	REI, Orion 2.4	SCDMAOP	Peanut Butter Jar	
√	167	REI, Orion 2.4	SCDMAOFF	Peanut Butter Jar	
√	168	REI, Orion 2.4	SGSMOP	Peanut Butter Jar	
√	169	REI, Orion 2.4	SGSMOFF	Peanut Butter Jar	
√	170	REI, Orion 2.4	Accessories	Peanut Butter Jar	
√	171	REI, Orion 2.4	AED OFF	Peanut Butter Jar	
√	172	REI, Orion 2.4	EMPTY	Peanut Butter Jar	

√	Test #	Device A	Target	Vessel	Comments
√	173	BV, MantaRay	BCDMAOP	Aluminum Foil	
√	174	BV, MantaRay	BCDMAOFF	Aluminum Foil	
√	175	BV, MantaRay	BGSMOP	Aluminum Foil	
√	176	BV, MantaRay	BGSMOFF	Aluminum Foil	
√	177	BV, MantaRay	SCDMAOP	Aluminum Foil	
√	178	BV, MantaRay	SCDMAOFF	Aluminum Foil	
√	179	BV, MantaRay	SGSMOP	Aluminum Foil	
√	180	BV, MantaRay	SGSMOFF	Aluminum Foil	
√	181	BV, MantaRay	Accessories	Aluminum Foil	
√	182	BV, MantaRay	AED OFF	Aluminum Foil	
√	183	BV, MantaRay	EMPTY	Aluminum Foil	

√	Test #	Device B	Target	Vessel	Comments
√	184	BV, PocketHound	BCDMAOP	Aluminum Foil	
√	185	BV, PocketHound	BCDMAOFF	Aluminum Foil	
√	186	BV, PocketHound	BGSMOP	Aluminum Foil	
√	187	BV, PocketHound	BGSMOFF	Aluminum Foil	
√	188	BV, PocketHound	SCDMAOP	Aluminum Foil	
√	189	BV, PocketHound	SCDMAOFF	Aluminum Foil	
√	190	BV, PocketHound	SGSMOP	Aluminum Foil	
√	191	BV, PocketHound	SGSMOFF	Aluminum Foil	
√	192	BV, PocketHound	Accessories	Aluminum Foil	
√	193	BV, PocketHound	AED OFF	Aluminum Foil	
√	194	BV, PocketHound	EMPTY	Aluminum Foil	

√	Test #	Device C	Target	Vessel	Comments
√	195	BV, WolfHoundPro	BCDMAOP	Aluminum Foil	
√	196	BV, WolfHoundPro	BCDMAOFF	Aluminum Foil	
√	197	BV, WolfHoundPro	BGSMOP	Aluminum Foil	
√	198	BV, WolfHoundPro	BGSMOFF	Aluminum Foil	
√	199	BV, WolfHoundPro	SCDMAOP	Aluminum Foil	
√	200	BV, WolfHoundPro	SCDMAOFF	Aluminum Foil	
√	201	BV, WolfHoundPro	SGSMOP	Aluminum Foil	
√	202	BV, WolfHoundPro	SGSMOFF	Aluminum Foil	
√	203	BV, WolfHoundPro	Accessories	Aluminum Foil	
√	204	BV, WolfHoundPro	AED OFF	Aluminum Foil	
√	205	BV, WolfHoundPro	EMPTY	Aluminum Foil	

√	Test #	Device E	Target	Vessel	Comments
√	206	REI, Orion 2.4	BCDMAOP	Aluminum Foil	
√	207	REI, Orion 2.4	BCDMAOFF	Aluminum Foil	
√	208	REI, Orion 2.4	BGSMOP	Aluminum Foil	
√	209	REI, Orion 2.4	BGSMOFF	Aluminum Foil	
√	210	REI, Orion 2.4	SCDMAOP	Aluminum Foil	
√	211	REI, Orion 2.4	SCDMAOFF	Aluminum Foil	
√	212	REI, Orion 2.4	SGSMOP	Aluminum Foil	
√	213	REI, Orion 2.4	SGSMOFF	Aluminum Foil	
√	214	REI, Orion 2.4	Accessories	Aluminum Foil	
√	215	REI, Orion 2.4	AED OFF	Aluminum Foil	
√	216	REI, Orion 2.4	EMPTY	Aluminum Foil	

APPENDIX D
PATROL SCENARIO TEST SCRIPT

Key to Test Script Abbreviations

Target	Abbreviation
Burner CDMA (ON/Active)	BCDMAOA
Burner CDMA (ON/Passive)	BCDMAOP
Burner CDMA (OFF)	BCDMAOFF
Burner GSM (ON/Active)	BGSMOA
Burner GSM (ON/Passive)	BGSMOP
Burner GSM (OFF)	BGSMOFF
Smart CDMA (ON/Active)	SCDMAOA
Smart CDMA (ON/Passive)	SCDMAOP
Smart CDMA (OFF)	SCDMAOFF
Smart GSM (ON/Active)	SGSMOA
Smart GSM (ON/Passive)	SGSMOP
Smart GSM (OFF)	SGSMOFF
Phone Accessories	Accessories
Empty (No Target)	EMPTY
AED (OFF)	AED OFF
Empty (No Target)	EMPTY

A script listing all the Vessel+Target combinations to be included in Patrol Scenario Testing will be established on completion of Baseline Testing in accordance with criteria discussed previously. Specifically:

- Any devices that cannot detect phones > 10' away (as established by Baseline Testing) will not participate in Patrol Scenario Testing.
- Any devices that cannot detect phones that are OFF (as established by Baseline Testing) will only be tested against cell phone targets that are in ON/Active and ON/Passive modes.
- If Baseline Tests for all devices fail to detect any targets in a given vessel, then that vessel will not be included in Patrol Scenario Testing.
- If Baseline Tests for all devices fail to detect a specific Vessel+Target combination, then that Vessel+Target will not be included in Patrol Testing.
- Phones in ON/Active and ON/Passive modes or AEDs (ON or OFF) will not be tested in the peanut butter jar or aluminum foil vessels, since inmates do not generally conceal phones that are ON in these vessels and there is no need for an inmate to conceal an AED.
- Concrete vessels are NOT used in these tests. The cell wall construction serves as a natural concrete vessel.
- Cell phones in either ON/Active or ON/Passive modes will only be placed in cardboard vessels during the Patrol Scenario.
- AEDs will not be "planted" or concealed in cells. Real world AEDs in possession of inmates will constitute organically occurring distracter targets that may occur in operational environment. If the device alerts on an inmate's AED, it will be noted.

Subject to Baseline Testing and validation, it is projected that the Patrol Scenario Test Script will be:

Patrol Scenario Tests

Notes: Only RFD devices proved capable (during Baseline Testing) of detecting cell phones at distances greater than 10 feet (the depth of a typical inmate cell from front to rear). Therefore, all NLJD devices have been excluded from Patrol Scenario Testing.

It is expected to be demonstrated during Baseline Testing that RF devices only detect cell phones that are ON (i.e., emanating RF energy). Therefore, the Patrol Scenario Testing will be limited to the two RF devices (BV, PocketHound and BV, WolfhoundPro), and the targets will be limited to cell phones that are in either ON/Active or ON/Passive Mode. No AEDs will be planted in inmate cells. An empty cardboard vessel may be planted for control purposes.

Since inmates do not generally conceal cell phones that are ON in aluminum foil or peanut butter, these target/vessel configurations will not be used during Patrol Scenario Testing. The cell wall construction will serve as a natural concrete vessel so there is no need to conceal any targets in concrete blocks during the Patrol Scenario Testing. Patrol Scenario Testing will be limited to the cardboard vessel only. This set of 18 tests will be repeated for a total of 36 tests.

√	Test #	Device B	Target	Vessel	Comments
√	1	BV, PocketHound	BCDMAOA	Cardboard	
√	2	BV, PocketHound	BCDMAOP	Cardboard	
√	3	BV, PocketHound	BGSMOA	Cardboard	
√	4	BV, PocketHound	BGSMOP	Cardboard	
√	5	BV, PocketHound	SCDMAOA	Cardboard	
√	6	BV, PocketHound	SCDMAOP	Cardboard	
√	7	BV, PocketHound	SGSMOA	Cardboard	
√	8	BV, PocketHound	SGSMOP	Cardboard	
√	9	BV, PocketHound	EMPTY	Cardboard	

√	Test #	Device C	Target	Vessel	Comments
√	10	BV, WolfHoundPro	BCDMAOA	Cardboard	
√	11	BV, WolfHoundPro	BCDMAOP	Cardboard	
√	12	BV, WolfHoundPro	BGSMOA	Cardboard	
√	13	BV, WolfHoundPro	BGSMOP	Cardboard	
√	14	BV, WolfHoundPro	SCDMAOA	Cardboard	
√	15	BV, WolfHoundPro	SCDMAOP	Cardboard	
√	16	BV, WolfHoundPro	SGSMOA	Cardboard	
√	17	BV, WolfHoundPro	SGSMOP	Cardboard	
√	18	BV, WolfHoundPro	EMPTY	Cardboard	

APPENDIX E
PATROL SCENARIO TEST SCRIPT

Key to Test Script Abbreviations

Target	Abbreviation
Burner CDMA (ON/Active)	BCDMAOA
Burner CDMA (ON/Passive)	BCDMAOP
Burner CDMA (OFF)	BCDMAOFF
Burner GSM (ON/Active)	BGSMOA
Burner GSM (ON/Passive)	BGSMOP
Burner GSM (OFF)	BGSMOFF
Smart CDMA (ON/Active)	SCDMAOA
Smart CDMA (ON/Passive)	SCDMAOP
Smart CDMA (OFF)	SCDMAOFF
Smart GSM (ON/Active)	SGSMOA
Smart GSM (ON/Passive)	SGSMOP
Smart GSM (OFF)	SGSMOFF
Phone Accessories	Accessories
AED (ON/Passive)	AED ON
AED (OFF)	AED OFF
Empty (No Target)	EMPTY

A script listing all the Vessel+Target combinations to be included in Cell Search Scenario Testing will be established on completion of Baseline Testing in accordance with criteria discussed previously. Specifically:

- If Baseline Tests for all devices fail to detect any targets in a given vessel, then that vessel will not be included in Cell Search Scenario Testing.
- If Baseline Tests for all devices fail to detect a specific Vessel+Target combination, then that Vessel+Target will not be included in Cell Search Scenario Testing.
- Phones in ON/Active and ON/Passive modes or AEDs (ON or OFF) will not be tested in the peanut butter jar or aluminum foil vessels since inmates do not generally conceal phones that are ON in these vessels and there is no need for an inmate to conceal an AED.
- Concrete vessels are NOT used in these tests.
- Cell phones in either ON/Active and ON/Passive modes will only be placed in cardboard vessels.
- AEDs will not be planted or concealed in cells. Real-world AEDs in possession of inmates will constitute organically occurring distracter targets that may occur in operational environment. If the device alerts on an inmate's AED it will be noted.

Subject to Baseline Testing and validation, it is projected that the Cell Search Scenario Test Script will be:

Cell Search Scenario Tests

Notes: Since inmates do not generally conceal cell phones that are ON in aluminum foil or peanut butter, these target/vessel configurations will not be used during Cell Search Scenario Testing. The cell wall construction will serve as a natural concrete vessel so there is no need to conceal any targets in concrete blocks during the Cell Search Scenario Testing. Cell Search Scenario Testing will be limited to the cardboard, peanut butter jar and aluminum foil vessels. No AEDs will be planted in cells. Since Baseline Testing demonstrated

that RFD devices are not designed to detect a cell phone unless the target cell phone is in either the ON/Active or ON/Passive mode, it is stipulated that the two RFD devices will not be tested against targets that are OFF.

√	Test #	Device A	Target	Vessel	Comments
	1	BV, MantaRay	BCDMAOA	Cardboard	Ferromagnetic Detector
	2	BV, MantaRay	BCDMAOP	Cardboard	
√	3	BV, MantaRay	BCDMAOFF	Cardboard	
	4	BV, MantaRay	BGSMOA	Cardboard	
	5	BV, MantaRay	BGSMOP	Cardboard	
√	6	BV, MantaRay	BGSMOFF	Cardboard	
	7	BV, MantaRay	SCDMAOA	Cardboard	
	8	BV, MantaRay	SCDMAOP	Cardboard	
√	9	BV, MantaRay	SCDMAOFF	Cardboard	
	10	BV, MantaRay	SGSMOA	Cardboard	
	11	BV, MantaRay	SGSMOP	Cardboard	
√	12	BV, MantaRay	SGSMOFF	Cardboard	
	13	BV, MantaRay	Accessories	Cardboard	
√	14	BV, MantaRay	EMPTY	Cardboard	

√	Test #	Device B	Target	Vessel	Comments
√	15	BV, PocketHound	BCDMAOA	Cardboard	RF Detector
	16	BV, PocketHound	BCDMAOP	Cardboard	
	17	BV, PocketHound	BCDMAOFF	Cardboard	Stipulate RF can't do OFF
√	18	BV, PocketHound	BGSMOA	Cardboard	
	19	BV, PocketHound	BGSMOP	Cardboard	
	20	BV, PocketHound	BGSMOFF	Cardboard	Stipulate RF can't do OFF
√	21	BV, PocketHound	SCDMAOA	Cardboard	
	22	BV, PocketHound	SCDMAOP	Cardboard	
	23	BV, PocketHound	SCDMAOFF	Cardboard	Stipulate RF can't do OFF
√	24	BV, PocketHound	SGSMOA	Cardboard	
	25	BV, PocketHound	SGSMOP	Cardboard	
	26	BV, PocketHound	SGSMOFF	Cardboard	Stipulate RF can't do OFF
	27	BV, PocketHound	Accessories	Cardboard	Stipulate RF can't do OFF
	28	BV, PocketHound	EMPTY	Cardboard	

√	Test #	Device C	Target	Vessel	Comments
√	29	BV, WolfHoundPro	BCDMAOA	Cardboard	RF Detector
	30	BV, WolfHoundPro	BCDMAOP	Cardboard	
	31	BV, WolfHoundPro	BCDMAOFF	Cardboard	Stipulate RF can't do OFF
√	32	BV, WolfHoundPro	BGSMOA	Cardboard	
	33	BV, WolfHoundPro	BGSMOP	Cardboard	
	34	BV, WolfHoundPro	BGSMOFF	Cardboard	Stipulate RF can't do OFF
√	35	BV, WolfHoundPro	SCDMAOA	Cardboard	
	36	BV, WolfHoundPro	SCDMAOP	Cardboard	
	37	BV, WolfHoundPro	SCDMAOFF	Cardboard	Stipulate RF can't do OFF
√	38	BV, WolfHoundPro	SGSMOA	Cardboard	
	39	BV, WolfHoundPro	SGSMOP	Cardboard	
	40	BV, WolfHoundPro	SGSMOFF	Cardboard	Stipulate RF can't do OFF
	41	BV, WolfHoundPro	Accessories	Cardboard	Stipulate RF can't do OFF
	42	BV, WolfHoundPro	EMPTY	Cardboard	Stipulate RF can't do OFF

√	Test #	Device E	Target	Vessel	Comments
√	43	REI, Orion 2.4	BCDMAOA	Cardboard	NLJD
√	44	REI, Orion 2.4	BCDMAOP	Cardboard	
√	45	REI, Orion 2.4	BCDMAOFF	Cardboard	
	46	REI, Orion 2.4	BGSMOA	Cardboard	
	47	REI, Orion 2.4	BGSMOP	Cardboard	
√	48	REI, Orion 2.4	BGSMOFF	Cardboard	
	49	REI, Orion 2.4	SCDMAOA	Cardboard	
	50	REI, Orion 2.4	SCDMAOP	Cardboard	
√	51	REI, Orion 2.4	SCDMAOFF	Cardboard	
	52	REI, Orion 2.4	SGSMOA	Cardboard	
	53	REI, Orion 2.4	SGSMOP	Cardboard	
√	54	REI, Orion 2.4	SGSMOFF	Cardboard	
	55	REI, Orion 2.4	Accessories	Cardboard	
	56	REI, Orion 2.4	EMPTY	Cardboard	

√	Test #	Device A	Target	Vessel	Comments
√	57	BV, MantaRay	BCDMAOFF	Peanut Butter Jar	Ferromagnetic Detector
√	58	BV, MantaRay	BGSMOFF	Peanut Butter Jar	
√	59	BV, MantaRay	SCDMAOFF	Peanut Butter Jar	
	60	BV, MantaRay	SGSMOFF	Peanut Butter Jar	
√	61	BV, MantaRay	Accessories	Peanut Butter Jar	
√	62	BV, MantaRay	EMPTY	Peanut Butter Jar	

√	Test #	Device B	Target	Vessel	Comments
	63	BV, PocketHound	BCDMAOFF	Peanut Butter Jar	RF Detector
	64	BV, PocketHound	BGSMOFF	Peanut Butter Jar	Stipulate RF can't do OFF
	65	BV, PocketHound	SCDMAOFF	Peanut Butter Jar	Stipulate RF can't do OFF
	66	BV, PocketHound	SGSMOFF	Peanut Butter Jar	Stipulate RF can't do OFF
	67	BV, PocketHound	Accessories	Peanut Butter Jar	Stipulate RF can't do OFF
	68	BV, PocketHound	EMPTY	Peanut Butter Jar	Stipulate RF can't do OFF

√	Test #	Device C	Target	Vessel	Comments
	69	BV, WolfHoundPro	BCDMAOFF	Peanut Butter Jar	RF Detector
	70	BV, WolfHoundPro	BGSMOFF	Peanut Butter Jar	Stipulate RF can't do OFF
	71	BV, WolfHoundPro	SCDMAOFF	Peanut Butter Jar	Stipulate RF can't do OFF
	72	BV, WolfHoundPro	SGSMOFF	Peanut Butter Jar	Stipulate RF can't do OFF
	73	BV, WolfHoundPro	Accessories	Peanut Butter Jar	Stipulate RF can't do OFF
	74	BV, WolfHoundPro	EMPTY	Peanut Butter Jar	

√	Test #	Device E	Target	Vessel	Comments
√	75	REI, Orion 2.4	BCDMAOFF	Peanut Butter Jar	NLJD
	76	REI, Orion 2.4	BGSMOFF	Peanut Butter Jar	
√	77	REI, Orion 2.4	SCDMAOFF	Peanut Butter Jar	
	78	REI, Orion 2.4	SGSMOFF	Peanut Butter Jar	
	79	REI, Orion 2.4	Accessories	Peanut Butter Jar	
	80	REI, Orion 2.4	EMPTY	Peanut Butter Jar	

√	Test #	Device A	Target	Vessel	Comments
√	81	BV, MantaRay	BCDMAOFF	Aluminum Foil	Ferromagnetic Detector
	82	BV, MantaRay	BGSMOFF	Aluminum Foil	
√	83	BV, MantaRay	SCDMAOFF	Aluminum Foil	
√	84	BV, MantaRay	SGSMOFF	Aluminum Foil	
	85	BV, MantaRay	Accessories	Aluminum Foil	
	86	BV, MantaRay	EMPTY	Aluminum Foil	

√	Test #	Device B	Target	Vessel	Comments
	87	BV, PocketHound	BCDMAOFF	Aluminum Foil	RF Detector
	88	BV, PocketHound	BGSMOFF	Aluminum Foil	Stipulate RF can't do OFF
	89	BV, PocketHound	SCDMAOFF	Aluminum Foil	Stipulate RF can't do OFF
	90	BV, PocketHound	SGSMOFF	Aluminum Foil	Stipulate RF can't do OFF
	91	BV, PocketHound	Accessories	Aluminum Foil	Stipulate RF can't do OFF
	92	BV, PocketHound	EMPTY	Aluminum Foil	

√	Test #	Device C	Target	Vessel	Comments
	93	BV, WolfHoundPro	BCDMAOFF	Aluminum Foil	RF Detector
	94	BV, WolfHoundPro	BGSMOFF	Aluminum Foil	Stipulate RF can't do OFF
	95	BV, WolfHoundPro	SCDMAOFF	Aluminum Foil	Stipulate RF can't do OFF
	96	BV, WolfHoundPro	SGSMOFF	Aluminum Foil	Stipulate RF can't do OFF
	97	BV, WolfHoundPro	Accessories	Aluminum Foil	Stipulate RF can't do OFF
	98	BV, WolfHoundPro	EMPTY	Aluminum Foil	Stipulate RF can't do OFF

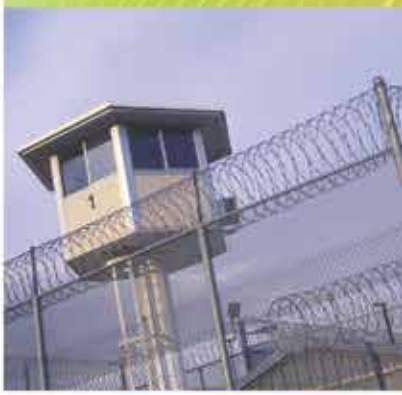
√	Test #	Device E	Target	Vessel	Comments
√	99	REI, Orion 2.4	BCDMAOFF	Aluminum Foil	NLJD
	100	REI, Orion 2.4	BGSMOFF	Aluminum Foil	
	101	REI, Orion 2.4	SCDMAOFF	Aluminum Foil	
√	102	REI, Orion 2.4	SGSMOFF	Aluminum Foil	
	103	REI, Orion 2.4	Accessories	Aluminum Foil	
	104	REI, Orion 2.4	EMPTY	Aluminum Foil	

Plus 18 Control Tests without using any hand-held cell phone detector device					
√	Test #	Device E	Target	Vessel	Comments
	105	None	BCDMAOFF	Cardboard	NLJD
	106	None	SGSMOFF	Cardboard	
	107	None	EMPTY	Cardboard	
	109	None	BCDMAOFF	Cardboard	
	109	None	SGSMOFF	Cardboard	
	110	None	EMPTY	Cardboard	

√	Test #	Device E	Target	Vessel	Comments
	111	None	BCDMAOFF	Peanut Butter Jar	NLJD
	112	None	SGSMOFF	Peanut Butter Jar	
	113	None	EMPTY	Peanut Butter Jar	
	114	None	BCDMAOFF	Peanut Butter Jar	
	115	None	SGSMOFF	Peanut Butter Jar	
	116	None	EMPTY	Peanut Butter Jar	

√	Test #	Device E	Target	Vessel	Comments
	117	None	BCDMAOFF	Aluminum Foil	NLJD
	118	None	SGSMOFF	Aluminum Foil	
	119	None	EMPTY	Aluminum Foil	
	120	None	BCDMAOFF	Aluminum Foil	
	121	None	SGSMOFF	Aluminum Foil	
	122	None	EMPTY	Aluminum Foil	

APPENDIX F
KNOWN USERS, REFERENCES AND CONTACTS



1. BVS, MantaRay™

Known Users, References and Contacts (List):
* Indicates a vendor-provided reference.

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2. BVS, PocketHound™

Known Users, References and Contacts (List):
* Indicates a vendor-provided reference.

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Phone: (608) 240-5051
steven.wierenga@wisconsin.gov

3. BVS, WolfHound Pro™

Known Users, References and Contacts (List):
* Indicates a vendor-provided reference.

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Maryland Department of Public Safety and Correctional Services
Attn: Jay Miller
Correctional Operations IT Manager
6776 Reisterstown Rd., Ste. 311
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Phone: (443) 250-4695
JEMiller@dpscs.state.md.us
Note: The MDPSCS used a predecessor model of the BVS WolfHound Pro™ known as the BloodHound™.

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* TSCM Corporation
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4. REI, Orion 2.4™

Known Users, References and Contacts (List):
* Indicates a vendor-provided reference.

* REI considers their client list to be proprietary, per Lee Jones, director of sales. He declined to provide this information. It is public information and well-known in the corrections technology community that the Tennessee Department of Correction was an early adopter of this technology.

Tennessee Department of Correction
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Executive Assistant
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Nashville, TN 37243
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lolie.jones@tn.gov

APPENDIX G

MANTARAY™ PRODUCT LITERATURE

Manta Ray

Close Range Phone Detector

Manta Ray™ is the answer to the growing problem of illegal and contraband cell phones in correctional facilities, government buildings and law enforcement agencies. Berkeley's unique cell phone detection device is a close range security scanner for concealed mobile phones (ON or OFF and even with battery removed). Manta Ray™ differs from traditional metal detectors in that it scans for specific components common to all cell phones and not just metal. This reduces false triggers * such as watches, keys, coins, belt buckles and other common metal items that would trigger a standard metal detector. Manta Ray™ is the perfect tool for any security detail tasked with rapid scans of many targets as well as targeted searches for cellular phones hidden behind, inside or among common structures. Manta Ray™ works right out of the box for anyone with a vibrant LCD and standard removable 9V battery power. Manta Ray™ is designed and manufactured entirely in the U.S.A..

- ✓Minimize False Triggers
- ✓Expedite Pat-Downs & Searches
- ✓Cost Effective & Simple Operation

Detect CellPhones ON or OFF!

Security Products Magazine 2013 New Product of the Year

Find Hidden Phones Anywhere

BRICK

POCKETS

METAL

BAG SEARCHES

CONCRETE

* *Some metallic objects other than phones may trigger the detector though most metals do not cause false detection.*

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TOLL FREE 1-888-737-4287
(outside U.S. & Canada) +1 732-548-3737
www.bvsystems.com
sales@bvsystems.com

Berkeley Varitronics Systems
Clarifying RF
Providing wireless solutions for over 40 years

Manta Ray

Close Range Phone Detector

MANTA RAY SPECIFICATIONS:

RANGE	0 - 6 Inches
POSSIBLE FALSE TRIGGERS	Some metallic objects, surfaces & areas of high electromagnetic activity
WEIGHT	10 Ounces
DIMENSIONS	7" x 3" x 2"
ALERTS	LCD, audio & blinking LEDs
CONTROLS	Trigger for power ON/OFF
SCREEN	Color TFT LCD 160 x 128 resolution
POWER	Removable 9 volt battery (alkaline & rechargable Ni-MH, lithium-ion batteries supported)
RUNTIME	Up to 3 hours of continuous use on standard 9V alkaline battery
INCLUDES	(2) 9 Volt alkaline batteries, handstrap, SD memory card containing videos & user guide

ACTUAL SIZE

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sales@bvsystems.com

Berkeley Varitronics Systems
Clarifying RF
Providing wireless solutions for over 40 years

APPENDIX H

POCKETHOUND™ PRODUCT LITERATURE

CELLPHONE DETECTOR
POCKETHOUND™

POCKET-SIZED AND COVERT

PocketHound™ is Berkeley's Varitronics Systems' highly sensitive cell phone detector that fits in your pocket. The receiver is specifically tuned to the RF signature of common 3G & 4G cell phones (both U.S. & European bands) including LTE, PCS, CDMA / WCDMA (UMTS), GSM, EGSM Cellular bands. Security personnel can discreetly detect any nearby cell phone in either standby mode* or during active voice, text or data RF transmissions making it the perfect tool for enforcing your NO WIRELESS security policy. PocketHound™ detects nearby (up to 75 feet indoors) cell phone use all from the user's pocket or in the palm of their hand. The integrated antenna and auto threshold feature only detect cell phone activity above the ambient RF noise of any environment. This prevents false triggers and makes it easy to use for non-technical personnel such as professors and security guards. Bright LEDs and integrated vibrator provide covert and constant, in-pocket mobile phone detection to users. PocketHound™ is designed and manufactured in the U.S.A.

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Call us today for more information:
TOLL FREE 1-888-737-4287
(outside U.S. & Canada) +1 732-548-3737
www.pockethound.com
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*Standby mode (autonomous registration) varies from base station to base station with phones typically registering between once every few minutes to up to 20 minutes. This time varies greatly based upon carriers, distance from base stations and individual handset manufacturers' standards.

Clarifying RF
BERKELEY VARITRONICS SYSTEMS
Providing wireless solutions for over 40 years

CELLPHONE DETECTOR POCKETHOUND™

POCKET-SIZED AND COVERT

RECEIVER SPECIFICATIONS:

U.S. BANDS

LTE Uplink 698-716 MHz (4G)
LTE Uplink 777-787 MHz (4G)
LTE Uplink 788-798 MHz (4G)
824-849 MHz (3G Cellular)
896-901 MHz (3G Cellular)
AWS Uplink 1710-1755 MHz (3G PCS)
1850-1910 MHz (3G PCS)

EURASIAN BANDS

(EGSM 900) 880-915 MHz
(GSM 1800) 1710.2-1784.8 MHz
(WCDMA/UMTS) 1920-1980 MHz

Additional Bands Supported:

Australia, New Zealand, Canada & Israel

RADIUS OF COVERAGE AREA	75 feet (~25 meters) under typical conditions (indoor line-of-sight)
DYNAMIC RANGE	60 dB
SENSITIVITY	-80 dBm (user selectable)
DETECTOR RESOLUTION	2 dB
BANDWIDTH RESOLUTION	4 MHz
SELECTIVITY REJECTION	>50 dB @ 1 MHz from uplink band edges
RECEIVING MODES	High-speed scanning (uplink cellphone bands)
ANTENNAS SUPPORTED	Internal directional flat panel antenna
INCLUDES	USB cable, mini USB 5VDC charger, PC configuration software

PocketHound's receiver is specifically tuned to the RF signature of common cell phones (both U.S. & European bands) so that other common RF such as Wi-Fi, cordless phones and Bluetooth do not trigger false positives

Super Bright LEDs indicate signal strength

PocketHound's covert flat panel antenna is integrated inside the unit to keep it sensitive and compact.

PocketHound can be set into vibrate mode for truly covert cell phone detection from your pocket

PocketHound's auto threshold only detects cellphone activity above the RF noise floor to ensure no false triggering.

Internal Li-PO battery system provides enough power for 2 hours of runtime.

actual size

Prisons & Correctional Facilities • Courtroom & Municipal Buildings • Law Enforcement Agencies • Financial Institutions • Universities & Testing Facilities

Call us today for more information:
TOLL FREE 1-888-737-4287 / (outside U.S. & Canada) +1 732-548-3737
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BERKELEY VARITRONICS SYSTEMS
Clarifying RF
Providing wireless solutions for over 40 years.

APPENDIX I

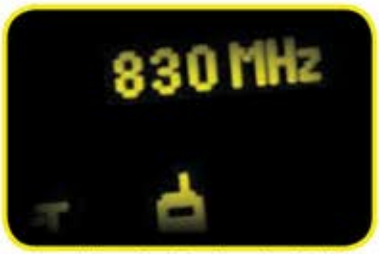
WOLFHOUND PRO™ PRODUCT LITERATURE

CELLPHONE DETECTOR WOLFHOUND PRO

PRECISION CELL PHONE DETECTION

Wolfhound™-PRO Cell Phone Detector is a precision, handheld, wireless sniffer specifically tuned to the RF signature of common cell phones (both U.S. & international bands) including LTE, AWS, PCS, CDMA / WCDMA (UMTS), GSM, EGSM Cellular bands as well as GPS trackers and even U.S. DECT 6.0 cordless phones that cause interference with European cellular carriers. Wolfhound™-PRO's high speed scanning receiver utilizes a multi-band DF (Direction Finding) antenna system allowing security personnel to locate nearby cell phones in either standby mode* or during active voice, text or data RF transmissions making it the perfect tool for enforcing your NO WIRELESS security policy. Wolfhound-PRO's simple trackball/pushbutton operation and ultra-bright OLED screen make it easy to use for both trained and untrained security personnel. In addition, Wolfhound-PRO™ identifies each cell-phone by frequency allowing for detection and identification of multiple cellphones. This can prove useful in situations in involving a variety of cellphone use such as large prisons and even disaster zones involving search and rescue operations. Wolfhound-PRO has up to 150 foot range for cell phone detection (indoors) and up to 1 mile outdoors (line-of sight) making it the most sensitive cell phone detector on the market. Wolfhound-PRO™is designed and manufactured in the U.S.A.

OLED displays realtime signal strength with user selectable threshold triggers and peak hold.



When Wolfhound-PRO has detected and "locked" onto cellular activity, the frequency is displayed.

Wolfhound-PRO discriminates between multiple detected cell phones and frequencies allowing the user to isolate and locate specific devices.

Backlit trackball/joystick/pushbutton allows for easy, one-handed operation from any user.

TOLL FREE 1-888-737-4287
(outside U.S. & Canada) +1 732-548-3737
www.bvsystems.com
sales@bvsystems.com

*Standby mode (autonomous registration) varies from base station to base station with phones typically registering between once every few minutes to up to 20 minutes. This time varies greatly based upon carriers, distance from base stations and individual handset manufacturers' standards.

CELLPHONE DETECTOR WOLFHOUND PRO

PRECISION CELL PHONE DETECTION

DEMODULATOR SPECIFICATIONS:

U.S. BANDS
includes U.S. DECT 6.0 Cordless Phones & GPS Tracking Device Frequencies

LTE Uplink 698-716 MHz
LTE Uplink 777-787 MHz
LTE Uplink 788-798 MHz
824-849 MHz
896-901 MHz
AWS Uplink 1710-1755 MHz
1850-1910 MHz

EURASIAN BANDS
(includes EU, Australia, New Zealand, Canada & Israel)

(EGSM 900) 880-915 MHz
(GSM 1800) 1710.2-1784.8 MHz
(WCDMA/UMTS) 1920-1980 MHz

RADIUS OF COVERAGE AREA	150 feet (~50 meters) under typical conditions
DYNAMIC RANGE	60 dB
SENSITIVITY	-83 dBm (user selectable)
DETECTOR RESOLUTION	2 dB
BANDWIDTH RESOLUTION	4 MHz
SELECTIVITY REJECTION	>50 dB @ 1 MHz from uplink band edges
RECEIVING MODES	High-speed scanning (uplink cellphone bands)
ANTENNAS SUPPORTED	Optional Direction finding (field-swappable multiband panel antenna with SMA connector) Included Omni-directional (quarter-wave multiband, monopolar antenna with SMA connector)

Wolfhound-PRO Cell Phone Detector Advantages:

- Receiver design boasts a dynamic range of 60 dB with user selectable sensitivity
- User selectable sensitivity from -83 dBm to –53 dBm with a resolution of 2dB for detection in a noisy environment
- Selectivity: rejection of at least 50 dB at 1 MHz from the uplink frequency bands provides high immunity from false triggering caused by base stations, personal communication devices and other sources of RF interference
- Discovery and logging capability allows the user to record and timestamp multiple cellphones simultaneously
- USB port streams measurements to a PC for further analysis
- User selectable mobile frequency bands allow the same unit to be used around the world; both USA & international support
- Detects and displays the phone's transmitting frequency with resolution ± 2 MHz
- Detects U.S. DECT 6.0 cordless phones and even GPS trackers
- Integrated laser-assisted directional antenna (green 532 nm laser, 50 feet mimimum span)
- Internal Li-ION battery provides runtime of 4+ hours
- Weighs less than 2 lbs. (30 oz.) fully loaded or just over 1 lb. (18 oz.) using omni-directional antenna

Every Wolfhound-PRO ships with:

- Wolfhound-PRO Cell Phone Detector
- External charging power transformer
- Omni band antenna (800/1900 MHz)
- WideBand DF - Direction Finding antenna
- Integrated laser-assist module
- Ear bud for privacy mode
- Rugged hard Pelican briefcase (secure lock)

Wolfhound-PRO also detects U.S. DECT 6.0 cordless phones and portable GPS tracking devices too.

Prisons & Correctional Facilities • Government & Military Installations • Law Enforcement Agencies • Financial Institutions • Anti-Terrorism Operations

Call us today for more information:
TOLL FREE 1-888-737-4287 / (outside U.S. & Canada) +1 732-548-3737
www.bvsystems.com
sales@bvsystems.com

CAUTION
LASER RADIATION
DO NOT STARE INTO BEAM
DIODE LASER

BERKELEY VARITRONICS SYSTEMS
Clarifying RF
Providing wireless solutions for over 40 years.

APPENDIX J

ORION 2.4™ PRODUCT LITERATURE

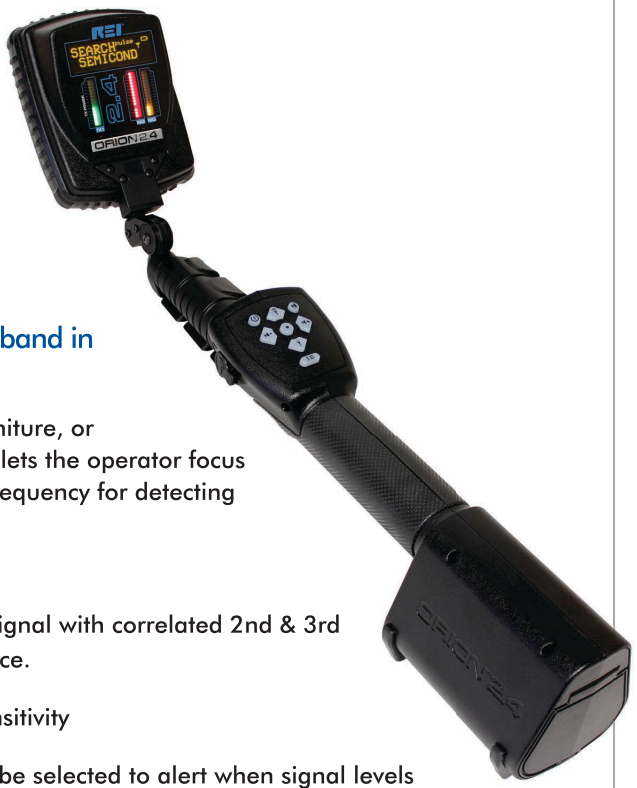
NEW ORION™ 2.4

Non-Linear Junction Detector

U.S. PATENTS: 5,815,122; 6,057,765; 6,163,259
U.K. PATENTS: GB2344423; GB2351154; GB2381077; GB2381078
Additional Patents Pending

Smaller, lighter, 2.4 GHz transmit frequency provides excellent detection and sensitivity!

The ORION is a state-of-the-art Non-Linear Junction Detector for detecting hidden electronic devices. A Non-Linear Junction Detector detects the presence of electronics, regardless of whether the electronic target is radiating, hard wired, or even turned off.



The ORION quickly detects and locates hidden electronic devices and is designed for:

- Commercial security applications such as checking corporate board rooms or offices for unauthorized or hidden electronics,
- Searching secure areas for hidden or prohibited electronics,
- Searching for contraband cell phones or other electronic contraband in prisons.

The ORION locates hidden electronics in walls, floors, ceilings, fixtures, furniture, or containers. The ORION has an antenna-mounted line-of-sight display that lets the operator focus on the target while sweeping. The NEW ORION 2.4 transmits at 2.4GHz frequency for detecting small electronics such as SIM cards and cell phones.

Technical Advantages

1. **DIGITAL MODULATION & CORRELATION -** digitally modulated transmit signal with correlated 2nd & 3rd harmonic response provides improved detection & minimizes interference.
2. **WIDE BANDWIDTH TRANSMIT SIGNAL:** 1.25MHz increases detection sensitivity
3. **MULTIPLE ALERT METHODS-** Alert tones and Haptic (vibration) alert can be selected to alert when signal levels surpass the trip levels
4. **LED HEAD LAMP:** Illuminates target area
5. **MANUAL OR AUTOMATIC POWER CONTROL** up to 3.3 watts
6. **SMALL LIGHTWEIGHT DESIGN -** weighs 2.8 lbs/1.3 kg
7. **LINE OF SIGHT ANTENNA MOUNTED DISPLAY** allows user to focus eyes on sweeping target and display at same time.
8. **INTEGRATED POLE -** no pole or cable assembly required.
9. **SYNTHESIZED TRANSCEIVER** provides frequency stability and agility to automatically search for clean operating frequencies (2.404GHz to 2.472GHz).
10. **CIRCULARLY POLARIZED TRANSMIT AND RECEIVE ANTENNA** removes risk of missing a threat due to incorrect antenna polarization.

* Preliminary Specifications. Product specifications and descriptions subject to change without notice.

455 Security Place • Cookeville, TN 38506 USA • TEL +1 931.537.6032
800.824.3190 (US ONLY) • FAX +1 931.537.6089 • www.reiusa.net

Research Electronics Intl®
TECHNICAL SECURITY SPECIALISTS

ORION™ 2.4

NON-LINEAR JUNCTION DETECTOR

ORION™ 2.4 ADVANTAGES

LIGHTWEIGHT DESIGN FOR EASE OF USE
OPERATIONAL WEIGHT LESS THAN 2.8lbs (1.3kg)

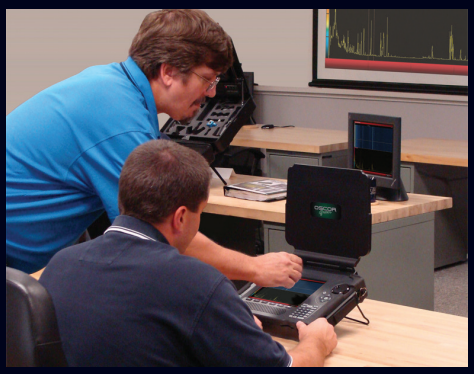
UTILIZES 2.4GHZ FREQUENCY BAND
OPTIMIZING DETECTION RANGE

MINIMUM SETUP TIME
SETUP IS QUICK, QUIET, AND EASY - NO CABLES, POLE SECTIONS, OR BULKY TRANSCEIVER TO ASSEMBLE OR CARRY

ANTENNA MOUNTED DISPLAY
FOR LINE-OF-SIGHT TARGET FOCUS

WIDE BANDWIDTH TRANSMIT SIGNAL: 1.25MHz
INCREASES DETECTION SENSITIVITY

DIGITAL MODULATION AND CORRELATION
PROVIDES INCREASED SENSITIVITY AND MINIMIZES INTERFERENCE



TRAINING BY REI INSTRUCTORS
REI offers regularly scheduled technical security training courses.

On-site training also available.
Course dates and registration online at www.reiusa.net or email sales@reiusa.net

RESEARCH ELECTRONICS INTERNATIONAL
455 SECURITY DRIVE
ALGOOD TN 38506 USA
TEL +1 931.537.6032 • 800.824.3190 (US ONLY)
FAX +1 931.537.6089
sales@reiusa.net • www.reiusa.net

MARKETING CHARACTERISTICS

TRANSMITTER

Frequency Bands: 2.404GHz - 2.472GHz
Transmit Channels: Manual or auto selection, more than 60 available
Transmit Power: 3.3 watts EIRP
Power Control: Manual or auto control
Transmit Modulation: Digital 1.25 MHz BW

RECEIVER

Simultaneous 2nd & 3rd harmonic receive
Digitally Correlated
Frequency Bands: Transmit Band (2.404GHz - 2.472GHz);
Second Harmonic (4.808GHz - 4.944GHz);
Third Harmonic (7.212GHz - 7.416GHz)
Sensitivity: -140 dBm for both harmonics

DISPLAY

Antenna-mounted Display
Bar Graph Display for transmit power level, 2nd harmonic level, 3rd harmonic level, data field display, for other information (operation mode, low battery, volume, DSP gain, etc.)

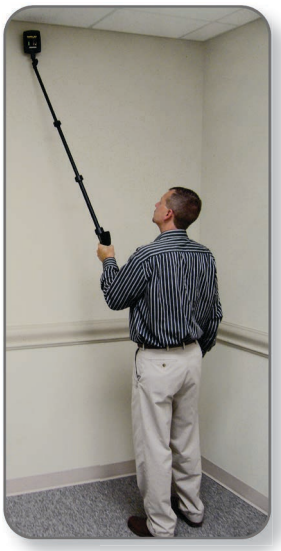
MECHANICAL

Extension Lengths: 16-51 in (40.6-129.5 cm)
Case Dimensions: 6.25 in x 14.9 in x 18.5 in (15.9 cm x 37.8 cm x 47.0 cm)
ORION 2.4 Dim: 22.4 in x 3.75 in x 3 in (57 cm x 9cm x 7.5 cm)
Overall Extended Length: 58 in (147 cm)
ORION 2.4 Weight w/Battery: 2.8 lbs (1.3kg)
Case Weight Including ORION & Accessories: 11.6 lbs (5.2kg)

BATTERY

Input AC: 100–240 V, 50–60 Hz
Run Time: >8 hours per battery (typical)
Charge Time: 2.5 hours per battery
Batteries: Lithium Ion Rechargeable Battery (2 included)


Telescoping antenna pole retracted.


Telescoping antenna pole extended.

APPENDIX K

REI ORION 2.4™ NLJD FCC COMPLIANCE CERTIFICATE

TCB

GRANT OF EQUIPMENT AUTHORIZATION

TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

Nemko Canada Inc.
303 River Road
Ottawa, Ontario, K1V 1H2
Canada

Date of Grant: 09/24/2013

Application Dated: 09/23/2013

Research Electronics International, LLC
455 Security Drive
Algood, TN 38506

Attention: Thomas Jones , General Manager

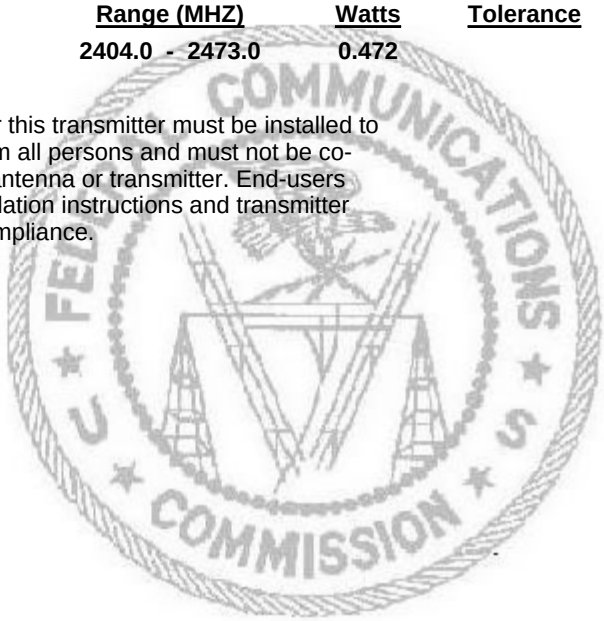
NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: EIH-ORION24
Name of Grantee: Research Electronics International, LLC
Equipment Class: Digital Transmission System
Notes: Non-Linear Junction Detector

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15C	2404.0 - 2473.0	0.472		

Power listed is conducted. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.



APPENDIX L
LIST OF ACRONYMS

Acronym	Definition
AED	Authorized Electronic Device
BVS	Berkeley Varitronics Systems
CD	Compact Disk
CDMA	Code Division Multiple Access
CoE	Center of Excellence
DC	Direct Current
DU	Denver University
DVD	Digital Video Disc
FAR	False Alarm Rate
FCC	Federal Communications Commission
FMD	Ferromagnetic Detection
FOUO-LES	For Official Use Only – Law Enforcement Sensitive
GSM	Global System for Mobile Communications, originally Groupe Spécial Mobile
KPM	Key Performance Measures
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LTE	Long Term Evolution
NIJ	National Institute of Justice
NLECTC	National Law Enforcement and Corrections Technology Center
NLJD	Non-Linear Junction Detection
PA DOC	Pennsylvania Department of Corrections
PB	Peanut Butter
REI	Research Electronics International
RFD	Radio Frequency Detection
SCI	State Correctional Institution
SD	Secure Digital

Acronym	Definition
SIM	Subscriber Identity Module
SME	Subject Matter Expert
TAR	True Alarm Rate
T&E	Test and Evaluation
TWG	Technology Working Group

APPENDIX M
DOJ/NIJ *FEDERAL REGISTER NOTICE*

DEPARTMENT OF JUSTICE

Office of Justice Programs

NIJ Evaluation of Hand-held Cell Phone Detector Devices

AGENCY: National Institute of Justice, DOJ.

ACTION: Notice of NIJ evaluation of hand-held cell phone detector devices.

SUMMARY: The National Institute of Justice (NIJ) is soliciting interest in supplying hand-held cell phone detector devices for participation in an evaluation by the NIJ Corrections Technology Center of Excellence (CX CoE). The evaluation is focused on field operation in correctional facility scenarios. Supplied hand-held cell phone detectors must:

- Weigh less than 8 pounds.
- Be battery operated with a minimum run time of two hours.
- Be designed for single person operation.
- Operate using Radio Frequency (RF) and/or Non-Linear Junction Detection (NLJD) technology

Manufacturers interested in participating in this evaluation will be asked to execute a Letter of Understanding. Participating manufacturers will receive a copy of the CX CoE Test & Evaluation Plan. Interested parties are invited to contact NIJ for information regarding participation, Letters of Understanding, and shipping. Letters of Understanding may be obtained from and should be submitted to Jack Harne, National Institute of Justice, Office of Science and Technology, 810 7th Street NW., Washington, DC 20531, emailed to jack.harne@usdoj.gov, or faxed to (202) 305-9907.

DATES: Manufacturers who wish to participate in the program must submit a request and an executed Letter of Understanding by 5 p.m. Eastern Time on June 24, 2013. Supplied devices are to be loaned to the CX CoE for a period of time no less than 90 days and must be received by the CX CoE by July 1, 2013.

FOR FURTHER INFORMATION CONTACT:
Jack Harne, by telephone at (202) 616-2911 [Note: this is not a toll-free telephone number], or by email at jack.harne@usdoj.gov.

Gregory K. Ridgeway
Acting Director
Deputy Director
National Institute of Justice

APPENDIX N
BASELINE TESTS

Test#: _____

Tester(s): _____ Date:_____

Test Procedure:

- Conduct tests in large room with all extraneous electronics and cell phones removed from the vicinity
- Conduct each test once for each target/vessel
  - Active phones (ON/Active) and active Authorized Electronic Devices (AED/ON) will not be tested in peanut butter (PB) jar or aluminum foil, since inmates don't generally conceal targets that are ON in these vessels and they would not be readily accessible for use.
- Order of tests is a random mix of all possible tests of which Operator 2 has no knowledge. (See Baseline Test Script.)
- For cell phones in (ON/Active) mode, call an established number and leave the call active, with the outside receiving phone (not the target of the test) placed on mute. Once established, no sound should be emanating from the test.
- Place target (or empty) into vessel by Operator 1.
- Operator 2 has no knowledge of target.
- Operator 2 starts test standing 20 feet away from vessel
- Turn on device.
- Wait 10 seconds.
- Slowly walk toward the vessel.
- End when the first noticeable True Alarm is obtained on the device, or when the device comes in contact with the vessel, whichever occurs first.
- Record distance when the alarm occurred or record No Detect if the device did not register a true alarm. To aid in recording measurements, the floor should be marked with one-foot increments for ease in recording of distance, the last foot to be marked in one-inch increments.

- For cell phones in (ON/Active) mode, remove the phone from the vessel and confirm the call was active the entire test. If call is disengaged, discard results and repeat test.
- Power-Up Test: For tests involving cell phones in On/Passive mode, operators are to perform a follow-up test:
  - Operator 2 returns to a distance of 20 feet with the detector device remaining on.
  - Operator 1 powers off the cell phone.
  - Operator 1 powers on the cell phone and immediately places it in the vessel as soon as the powering process starts.
  - Operator 2 records whether or not a True Alarm is detected.

After one minute, if no alarm is detected, then a No Detect result is recorded.

Notable Device Settings for Test (if any): _____
_____
_____

Range of Detection (Enter Measurement): _____ Feet _____ Inches

True Alarm (Yes/No): _____ False Alarm (Yes/No): _____

[*For On/Passive Phone Targets Only*] Power-Up True Alarm (Yes/No): _____

APPENDIX O
PATROL SCENARIO TESTS

Test#: _____

Tester(s): _____ Location: _____ Date: _____

Test Procedure:

1. Operator 1 plants vessel/target, Operator(s) 2-3 have no knowledge of what has been placed and in which cell. All target phones will be marked with tape for identification and inventory control purposes.

2. Order of tests is a random mix of all possible tests; Operator(s) 2-3 do not know the order of tests. (See test script at Appendix D.)

3. Conduct each test one time for each target/vessel and detector:

   a. Based on available time and resources, the full test script for the Patrol Scenario may be repeated multiple times.

   b. Any devices that cannot detect phones > 10 feet away (as established by Baseline Testing) will not participate in Patrol Scenario Testing; but will be subjected to Cell Search Scenario Testing. (Pass/Fail).

   c. Any devices that cannot detect phones that are OFF (as established by Baseline Testing) will only be tested against cell phone targets that are in ON/Active and ON/Passive Modes. (Pass/Fail).

   d. If Baseline Tests for all devices fail to detect a specific Vessel+Target combination, then that Vessel+Target will not be included in Patrol Testing.

   e. Phones in ON/Active or ON/Passive Modes, or AEDs (ON or OFF) will not be tested in the peanut butter jar or aluminum foil vessels, since inmates don't generally conceal phones that are ON in these vessels, and there is no need for an inmate to conceal an AED.

   f. Concrete vessels are NOT used in these tests. The cell wall construction serves as a natural concrete vessel.

g. AEDs will not be "planted" or concealed in cells. Real world AEDs in possession of inmates will constitute organically occurring distracter targets that may occur in operational environment. If the device alerts on an inmate's AED it will be noted.

h. For cell phones in ON/Active Mode, call an established number and leave the call active, with the outside receiving phone (not the target of the test) placed on mute. Once established, no sound should be emanating from the test target.

i. For cell phones in ON/Passive Mode, turn the phone ON and leave it in standby mode.

4. Place vessels in cells in locations consistent with places inmates usually store similar items.
5. Operator(s) 2-3 walk patrol normally.
6. If a visual and/or audible alarm is indicated:
   a. Stop patrol.
   b. Slowly survey and sweep in 360° circle while standing in place, move a couple feet in each direction to aid in location. Note the accuracy of any directional indication: (Check One)
      - EXCELLENT [5] = Alarm originates from a single cell; Device reports direction AND magnitude (or distance) to the target.
      - VERY GOOD [4] = Alarm originates from one of two cells; Device reports direction AND magnitude (or distance) to the target.
      - GOOD [3] = Alarm originates from one of three cells; Device reports direction OR magnitude (or distance) to the target.
      - FAIR [2] = Alarm originates from one of three cells; Device does not report direction or magnitude.
      - POOR [1] = Alarm originates from one of five cells; Device does not report direction or magnitude.
      - NOT APPLICABLE [0] = No alarm detected.
7. Operator(s) 2-3 pick a cell number or range of cell numbers (without entering the cell) that they believe houses the target based on device alarms and measurements.
8. Record After Test:
   - Nature of Each Alarm – True (Cell Phone) _____ False (AED) _____ False (Other) _____
   - True Alarm Detected (if applicable) – Yes _____ No _____
   - Correct Cell Identified by Operator – Yes _____ No _____ Undetermined _____
   - Time to walk patrol (in minutes) _____

Notable Device Settings for Test (if any): _____
_____ _____
_____
_____

APPENDIX P
CELL SEARCH SCENARIO TESTS

Test#: _____

Tester(s): _____ Location: _____ Date: _____

Test Procedure:

1. Conduct cell search in accordance with standard facility procedures
2. Operator 1 plants vessel/object, Operator(s) 2-3 have no knowledge of what has been placed. All target phones will be marked with tape for identification and inventory control purposes.
3. Order of tests is a random mix of all possible tests of which Operator 2 has no knowledge. (See test script at Appendix E.)
4. The vessel/object will be placed in an inmate's cell when the inmate is not present (e.g., when the inmates are at work, school or during recreational time).
5. Plant three vessels (cardboard box, PB Jar and aluminum foil) in all cells in all tests. Place the vessels in areas where inmates commonly place similar items, with the aluminum foil vessel to be concealed. For dummy aluminum foil, use empty plastic cell phone case to simulate size. The targets will be placed in one of the three vessels prior to placement.
6. Concrete vessel NOT used in these tests.
7. Conduct each test one time for each target/vessel and detector.
   a. For cell phones in (ON/Active) mode, call an established number and leave the call active, with the outside receiving phone (not the target of the test) placed on mute. Once established, no sound should be emanating from the test target.
   b. Phones in ON/Active or ON/Passive Modes, or AEDs (ON or OFF) will not be tested in the peanut butter jar or aluminum foil vessels, since inmates don't generally conceal phones that are ON in these vessels, and there is no need for an inmate to conceal an AED.
   c. If Baseline Tests for all devices fail to detect a specific Vessel+Target combination, then that Vessel+Target will not be included in Cell Search Testing.
   d. For cell phones in ON/Passive Mode, turn the phone ON and leave it in standby mode.

8. On the inmate's return to the cell, the inmate will be informed of the cell search test:

   a. A random cell search is being conducted as per standard facility procedures.

   b. The cell search is part of a DOC technology evaluation project.

   c. A dummy cell phone may or may not have been planted within the cell. The target has been marked with tape and its presence will have no impact on the inmate.

   d. Any other contraband or issues discovered that are restricted or in violation of DOC policy will be treated as usual and will result in standard responses or disciplinary action.

9. On initiating the cell search, the operator will perform a slow overview sweep of the cell, furniture and belongings without handling or disrupting items.

10. Perform a detailed search (as per standard facility procedures). After completing the hand search to his/her satisfaction, the operator will sweep each area/object slowly a final time with the hand-held cell phone detection device before proceeding to the next cell search.

11. Record:

- Time to conduct the cell search (in minutes) _____
- Nature of Each Alarm – True (Cell Phone) _____ False (AED) _____ False (Other) _____
- Found phone? Yes/No _____
- Accuracy of any directional information: (Check One)
  - EXCELLENT [5] = Operator is alerted of a target immediately upon beginning search; Provides magnitude (or distance) to the target that is sensitive to one inch.
  - VERY GOOD [4] = Operator is alerted of a target immediately upon beginning search; Provides magnitude (or distance) to the target that is sensitive to one foot.
  - GOOD [3] = During search, provides simple alarm within one foot of target; Device reports magnitude (or distance) on alarm.
  - FAIR [2] = During search, provides simple alarm within one foot of target; No magnitude (or distance) provided.
  - POOR [1] = Alarm position within cell unavailable; Device cannot specify location of target within the cell.
  - NOT APPLICABLE [0] = No alarm detected

Notable Device Settings for Test (if any): _____

_____

_____

APPENDIX Q

SPECIFIC PRODUCT INFORMATION (MANTARAY™)

NLECTC
Corrections Technology
Center of Excellence

4643 South Ulster St. • Suite 800 • Denver, CO 80237
Ph: 800-416-8086 • Fax 720-228-4048
www.justnet.org

Handheld Cell Phone Detection Test and Evaluation

Specific Product Information

Company Name: BERKELEY VARITRONICS SYSTEMS, INC.

Primary Contact: CARMINE CAFERRA, SALES MANAGER
255 LIBERTY ST., METUCHEN, NJ 08840
PH. (732) 548-3737, E-MAIL: CCAFERRA@BVSYSTEMS.COM

Model(s) to be submitted:

Model Name	Technology Employed	FCC Certification Required? (y/n)*
WOLFHOUND-PRO	RF RECEIVER	NO
POCKET HOUND	RF RECEIVER	NO
MANTA RAY	COMPONENT DETECTOR	NO

*Per the letter of understanding for participation in this evaluation all devices must comply with all relevant FCC regulations (e.g. regulations, regulatory compliance). If a submitted device(s) requires FCC certification please provide documentation to Dr. Shaffer - DrJShaffer@correctionscoe.org Documentation must be received before the evaluation begins.

Signature of vendor representative: C.A. Caferra

Date: 7-29-13

APPENDIX R

LETTERS OF UNDERSTANDING

To: Jack Harne
National Institute of Justice/Office of Science and Technology
810 7th Street NW
Washington, DC 20531.

June 26, 2013

RE: Letter of Understanding for Participation in the NIJ Evaluation of Hand-held Cell Phone Detector Devices (2013-11049)

Dear Mr. Harne,

The undersigned manufacturer or vendor (hereafter "vendor") is volunteering to participate in the National Institute of Justice (NIJ) Evaluation of Hand-held Cell Phone Detector Devices. The vendor acknowledges and accepts the following facts:

1. The evaluation is being performed by the NIJ Corrections Technology Center of Excellence (CX CoE), which is operated by the University of Denver.
2. The evaluation is focused on field operation in correctional facility scenarios.
3. As applicable, supplied hand-held detector devices must be fully certified by the Federal Communications Commission (FCC) for domestic civilian law enforcement operation

The vendor agrees to:

1. Supply a handheld cell phone detector device that has been certified by FCC (as applicable).
2. Loan of the device(s) to the CX CoE for a period of time no less than 90 days, to be received no later than July 1, 2013. **(Actual Date TBD)**

In exchange the CX CoE will:

1. Execute a Bailment Agreement to accept responsibility for the supplied equipment, to be executed prior to delivery of hand-held cell phone detector devices
2. Provide a copy of the CX CoE Hand-held Cell Phone Detector Test & Evaluation Plan to the vendor. The test plan is subject to change without vendor's approval or notice. Vendor feedback on the test plan will be considered, but the CX CoE is not obligated to incorporate any changes.
3. Evaluate the provided hand-held cell phone detector device(s) in field tests and correctional facility scenarios.
4. Provide a copy of the test results for the vendor's device(s) only

Best Regards,

Scott Schober
President/CEO

NLECTC
Corrections Technology
Center of Excellence

4643 South Ulster St. • Suite 800 • Denver, CO 80237
Ph: 800-416-8086 • Fax 720-228-4048
www.justnet.org

Handheld Cell Phone Detection Test and Evaluation

Vendor Training Requirements

To help ensure that the detection devices are operated in a manner consistent with manufacturer's recommendations the vendor shall provide training to officers at SCI-Chester.

1. Vendors must provide the same training and materials (at no cost) to approximately 15-20 end-users in this demonstration, as would be provided to any new customer (including operating/training manuals, CDs/DVDs , warranty information, etc.); and they must commit to working with the Facility Manager to schedule the end-user training on dates/times most convenient to the Facility.

2. Vendors must provide the training program details (i.e., objectives, content curriculum, training hours, class sizes, operating/training manuals, CDs/DVDs, etc.).

3. A Train-the-Trainer format is preferred.

I understand and agree to the training requirements.

Signature of vendor representative: C. A. Cafena

Company name: BERKELEY VARITRONICS SYSTEMS, INC.

Date: 7-29-13

Please sign and return to Dr. Shaffer - DrJShaffer@correctionscoe.org

Research Electronics International, LLC
455 Security Drive, Algood, TN 38506 USA

To:
Jack Harne
National Institute of Justice/Office of Science and Technology
810 7th Street NW
Washington, DC 20531.

RE: Letter of Understanding for Participation in the NIJ Evaluation of Hand-held Cell Phone Detector Devices (FRN Document Number)

Dear Mr. Harne,

The undersigned manufacturer or vendor (hereafter "vendor") is volunteering to participate in the National Institute of Justice (NIJ) Evaluation of Hand-held Cell Phone Detector Devices. The vendor acknowledges and accepts the following facts:

1. The evaluation is being performed by the NIJ Corrections Technology Center of Excellence (CX CoE), which is operated by the University of Denver.
2. The evaluation is focused on field operation in correctional facility scenarios.
3. As applicable, supplied hand-held detector devices must be fully certified by the Federal Communications Commission (FCC) for domestic civilian law enforcement operation

The vendor agrees to:

1. Supply a handheld cell phone detector device that has been certified by FCC (as applicable).
2. Loan of the device(s) to the CX CoE for a period of time no less than 90 days, to be received no later than July 1, 2013.

In exchange the CX CoE will:

1. Execute a Bailment Agreement to accept responsibility for the supplied equipment, to be executed prior to delivery of hand-held cell phone detector devices
2. Provide a copy of the CX CoE Hand-held Cell Phone Detector Test & Evaluation Plan to the vendor. The test plan is subject to change without vendor's approval or notice. Vendor feedback on the test plan will be considered, but the CX CoE is not obligated to incorporate any changes.
3. Evaluate the provided hand-held cell phone detector device(s) in field tests and correctional facility scenarios.
4. Provide a copy of the test results for the vendor's device(s) only

Please note that Vendor may decline to participate after reviewing the Test and Evaluation Plan.

Lee Jones 5-15-13

Lee Jones — Date
Director of Sales, lee@reiusa.net, 931 537-6032

NLECTC
Corrections Technology
Center of Excellence

4643 South Ulster St. • Suite 800 • Denver, CO 80237
Ph: 800-416-8086 • Fax 720-228-4048
www.justnet.org

Handheld Cell Phone Detection Test and Evaluation

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3. A Train-the-Trainer format is preferred.

I understand and agree to the training requirements.

Signature of vendor representative: _____

Company name: REI Research Electronics Intl. LLC

Date: August 15, 2013

Please sign and return to Dr. Shaffer - DrJShaffer@correctionscoe.org

JGW Group

1801 Robert Fulton Drive Suite 400
Reston, Virginia 20191 USA

To: Jack Harne
National Institute of Justice/Office of Science and Technology
810 7th Street NW
Washington, DC 20531.

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31 MAY 2013
Date

Jerry Leurs, Vice President
jleurs@jgwgroup.com
703 547 6270 ext 232

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Handheld Cell Phone Detection Test and Evaluation

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3. A Train-the-Trainer format is preferred.

I understand and agree to the training requirements.

Signature of vendor representative: [signature]

Company name: ANDIOTEL INTERNATIONAL LTD.

Date: 21 AUG, 13

Please sign and return to Dr. Shaffer - DrJShaffer@correctionscoe.org

To: Jack Harne
National Institute of Justice/Office of Science and Technology
810 7th Street NW
Washington, DC 20531.

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4. Provide a copy of the test results for the vendor's device(s) only.

Vendor: Cellution Technologies, Ltd.

By: 

NLECTC
Corrections Technology
Center of Excellence

4643 South Ulster St. • Suite 800 • Denver, CO 80237
Ph: 800-416-8086 • Fax 720-228-4048
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Handheld Cell Phone Detection Test and Evaluation

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2. Vendors must provide the training program details (i.e., objectives, content curriculum, training hours, class sizes, operating/training manuals, CDs/DVDs, etc.).

3. A Train-the-Trainer format is preferred.

I understand and agree to the training requirements.

Signature of vendor representative: [signature]

Company name: CELLUTION TECHNOLOGIES, LTD.

Date: 10-07-2013

Please sign and return to Dr. Shaffer - DrJShaffer@correctionscoe.org

APPENDIX S

HAND-HELD CELL PHONE DETECTION DEVICE SURVEY

Hand-Held Cell Phone Detection Device Survey

Operational Evaluation

This survey is designed to obtain your feedback based on your participation in the Operational Evaluation of the four (4) hand-held cell phone detection devices (the MantaRay ferromagnetic detector, the PocketHound radio frequency detector, the WolfHound Pro radio frequency detector, and the Orion 2.4 non-linear junction detector).

It is extremely important that you thoughtfully answer each question. If you miss a question, the survey will alert you to which question was missed (in red) and prompt you to complete that question. The survey program will not allow you to click "Done" at the end until all questions are answered.

It is also very important to obtain your feedback in the Comment Boxes. Please be as detailed as possible. Your efforts will help other corrections practitioners determine which hand-held cell phone detection devices to use.

*1. Please estimate how much time you spent using the MantaRay.

- ◯ 0-1 hour
- ◯ 1-4 hours
- ◯ 5-8 hours
- ◯ 9-12 hours
- ◯ 13-16 hours
- ◯ 17-20 hours
- ◯ 21-24 hours
- ◯ 25 or more hours

*2. Please estimate how much time you spent using the PocketHound.

- ◯ 0-1 hour
- ◯ 1-4 hours
- ◯ 5-8 hours
- ◯ 9-12 hours
- ◯ 13-16 hours
- ◯ 17-20 hours
- ◯ 21-24 hours
- ◯ 25 or more hours

*3. Please estimate how much time you spent using the WolfHound Pro.

- ◯ 0-1 hour
- ◯ 1-4 hours
- ◯ 5-8 hours
- ◯ 9-12 hours
- ◯ 13-16 hours
- ◯ 17-20 hours
- ◯ 21-24 hours
- ◯ 25 or more hours

*4. Please estimate how much time you spent using the Orion 2.4.

- ◯ 0-1 hour
- ◯ 1-4 hours
- ◯ 5-8 hours
- ◯ 9-12 hours
- ◯ 13-16 hours
- ◯ 17-20 hours
- ◯ 21-24 hours
- ◯ 25 or more hours

Hand-Held Cell Phone Detection Device Survey

***5. Please rank the durability of the MantaRay. Consider how you think this device will hold-up to daily use in the corrections environment.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

***6. Please rank the durability of the PocketHound. Consider how you think this device will hold-up to daily use in the corrections environment.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

Hand-Held Cell Phone Detection Device Survey

***7. Please rank the durability of the WolfHound Pro. Consider how you think this device will hold-up to daily use in the corrections environment.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

***8. Please rank the durability of the Orion 2.4. Consider how you think this device will hold-up to daily use in the corrections environment.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

Hand-Held Cell Phone Detection Device Survey

***9. Please rank the user interface display of the MantaRay. Consider how easy (or difficult) it is to interpret the alerts/displays that the device produces.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

***10. Please rank the user interface display of the PocketHound. Consider how easy (or difficult) it is to interpret the alerts/displays that the device produces.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

Hand-Held Cell Phone Detection Device Survey

***11. Please rank the user interface display of the WolfHound Pro. Consider how easy (or difficult) it is to interpret the alerts/displays that the device produces.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

***12. Please rank the user interface display of the Orion 2.4. Consider how easy (or difficult) it is to interpret the alerts/displays that the device produces.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

Hand-Held Cell Phone Detection Device Survey

***13. Please rank the ergonomics of the MantaRay. Consider size, weight, and user comfort level in your rating.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

***14. Please rank the ergonomics of the PocketHound. Consider size, weight, and user comfort level in your rating.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

Hand-Held Cell Phone Detection Device Survey

***15. Please rank the ergonomics of the WolfHound Pro. Consider size, weight, and user comfort level in your rating.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

***16. Please rank the ergonomics of the Orion 2.4. Consider size, weight, and user comfort level in your rating.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

Hand-Held Cell Phone Detection Device Survey

***17. What features do you like about the MantaRay device? (Choose all that apply,)**

- [ ] Durability
- [ ] Ergonomics (Size/Weight)
- [ ] User Interface (Alert Displays/Indicators)
- [ ] True Alarm Rate
- [ ] Battery Life
- [ ] Cost ($499)
- [ ] Other (please specify)

Hand-Held Cell Phone Detection Device Survey

***18. What features do you like about the PocketHound device? (Choose all that apply,)**

- [ ] Durability
- [ ] Ergonomics (Size/Weight)
- [ ] User Interface (Alert Displays/Indicators)
- [ ] True Alarm Rate
- [ ] Battery Life
- [ ] Cost ($499)
- [ ] Other (please specify)

Hand-Held Cell Phone Detection Device Survey

***19. What features do you like about the WolfHound Pro device? (Choose all that apply,)**

- [ ] Durability
- [ ] Ergonomics (Size/Weight)
- [ ] User Interface (Alert Displays/Indicators)
- [ ] True Alarm Rate
- [ ] Battery Life
- [ ] Cost ($2,400)
- [ ] Other (please specify)

Hand-Held Cell Phone Detection Device Survey

***20. What features do you like about the Orion 2.4 device? (Choose all that apply,)**

- [ ] Durability
- [ ] Ergonomics (Size/Weight)
- [ ] User Interface (Alert Displays/Indicators)
- [ ] True Alarm Rate
- [ ] Battery Life
- [ ] Cost ($15,000)
- [ ] Other (please specify)

Hand-Held Cell Phone Detection Device Survey

***21. What features do you NOT like about the MantaRay device? (Choose all that apply,)**

- [ ] Durability
- [ ] Ergonomics (Size/Weight)
- [ ] User Interface (Alert Displays/Indicators)
- [ ] False Alarm Rate
- [ ] Battery Life
- [ ] Cost ($499)
- [ ] Other (please specify)

Hand-Held Cell Phone Detection Device Survey

***22. What features do you NOT like about the PocketHound device? (Choose all that apply,)**

- [ ] Durability
- [ ] Ergonomics (Size/Weight)
- [ ] User Interface (Alert Displays/Indicators)
- [ ] False Alarm Rate
- [ ] Battery Life
- [ ] Cost ($499)
- [ ] Other (please specify)

Hand-Held Cell Phone Detection Device Survey

***23. What features do you NOT like about the WolfHound Pro device? (Choose all that apply,)**

- [ ] Durability
- [ ] Ergonomics (Size/Weight)
- [ ] User Interface (Alert Displays/Indicators)
- [ ] False Alarm Rate
- [ ] Battery Life
- [ ] Cost ($2,400)
- [ ] Other (please specify)

Hand-Held Cell Phone Detection Device Survey

***24. What features do you NOT like about the Orion 2.4 device? (Choose all that apply,)**

- [ ] Durability
- [ ] Ergonomics (Size/Weight)
- [ ] User Interface (Alert Displays/Indicators)
- [ ] False Alarm Rate
- [ ] Battery Life
- [ ] Cost ($15,000)
- [ ] Other (please specify)

Hand-Held Cell Phone Detection Device Survey

***25. Please indicate your OVERALL RATING for the MantaRay. Consider durability, user interface display, ergonomics, features, reliability, effectiveness, and cost in your rating.**

- ◯ 1 Poor
- ◯ 2 Fair
- ◯ 3 Good
- ◯ 4 Very Good
- ◯ 5 Excellent

Comments

Hand-Held Cell Phone Detection Device Survey

***26. Please indicate your OVERALL RATING for the PocketHound. Consider durability, user interface display, ergonomics, features, reliability, effectiveness, and cost in your rating.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

Hand-Held Cell Phone Detection Device Survey

***27. Please indicate your OVERALL RATING for the WolfHound Pro. Consider durability, user interface display, ergonomics, features, reliability, effectiveness, and cost in your rating.**

◯ 1 Poor ◯ 2 Fair ◯ 3 Good ◯ 4 Very Good ◯ 5 Excellent

Comments

Hand-Held Cell Phone Detection Device Survey

***28. Please indicate your OVERALL RATING for the Orion 2.4. Consider durability, user interface display, ergonomics, features, reliability, effectiveness, and cost in your rating.**

- ◯ 1 Poor
- ◯ 2 Fair
- ◯ 3 Good
- ◯ 4 Very Good
- ◯ 5 Excellent

Comments

Hand-Held Cell Phone Detection Device Survey

***29. Two of the hand-held cell phone detection devices are radio frequency detectors (RFDs) designed to only work when the target cell phone is "ON" (the PocketHound and the WolfHound Pro). Which of these two devices would you prefer to use to locate cell phones that are "ON"? Choose only one. Please explain your choice.**

- ◯ PocketHound
- ◯ WolfHound Pro

Please explain your choice.

Hand-Held Cell Phone Detection Device Survey

***30. Two of the hand-held cell phone detection devices are designed to work whether the target cell phone is "ON" or "OFF" (the MantaRay ferromagnetic detector and the Orion 2.4 non-linear junction detector). Which of these two devices would you prefer to use to locate cell phones that are "OFF"? Choose only one. Please explain your choice.**

- ◯ MantaRay
- ◯ Orion 2.4

Please explain your choice.

Hand-Held Cell Phone Detection Device Survey

***31. Operational Scenario: Assume that you receive credible intelligence from a reliable informant that there is a contraband cell phone in a specific inmate housing unit, but you don't know which inmate has it. You don't know whether the cell phone is currently "ON" or "OFF". You have access to all four hand-held cell phone detection devices (MantaRay, PocketHound, WolfHound Pro, and the Orion 2.4). Which detection device (or combination of detection devices), would you choose to help you find the contraband cell phone? Please explain your answer.**

Hand-Held Cell Phone Detection Device Survey

***32. Assume that you have been given permission to purchase any of the four hand-held cell phone detection devices. Which device (or devices) would you buy and why? Choose all that apply.**

- [ ] MantaRay
- [ ] PocketHound
- [ ] WolfHound Pro
- [ ] Orion 2.4

Please explain your choice (or choices).

Hand-Held Cell Phone Detection Device Survey

***33. Assume that you have been given permission to purchase only one of the four hand-held cell phone detection devices. Which device would you buy and why? Choose only one.**

- ◯ MantaRay
- ◯ PocketHound
- ◯ WolfHound Pro
- ◯ Orion 2.4

Please explain your choice (or choices).

Hand-Held Cell Phone Detection Device Survey

***34. Is there anything that could be done to improve the technology that would help you do your job more efficiently? Think, for example, what features you would like to see in the ideal hand-held cell phone detection device.**

◯ Yes (Please explain in the Comments Box below.)

◯ No

Comments

Hand-Held Cell Phone Detection Device Survey

***35. Do you have any final comments about your experience with these four hand-held cell phone detection devices that you would like to share with other correctional users?**

- ◯ Yes (Please explain in the Comments Box below.)
- ◯ No

Comments

Hand-Held Cell Phone Detection Device Survey

Thank You!

Thank you very much for your participation in the Operational Evaluation of hand-held cell phone detection devices and your thoughtful responses to this user survey. Your work will be extremely helpful to other corrections practitioners as they consider how best to combat the problem of contraband cell phones in prisons and jails.

When you click on the "Done" button below, your survey will be complete and will be sent to the Project Director. The survey will then return to the beginning and will be re-set for the next respondent. Please do not answer the survey more than one time.

Thanks again. Stay Safe!