



TSA SME Panel Project

AIR Deliverable 2.2.1

**SME Panel Meeting Report:
Draft Section 2 Indicator List**

Contract #: HSTS04-12-Q-CT9911

**Tracy Costigan, Ph.D.
Tanya Taylor, Ph.D
Zodie Makonnen, M.Ed.
Michele Toplitz, B.A.
Emily Baumann, M.S.**

**American Institutes for Research
1000 Thomas Jefferson Street, NW
Washington, DC 20007-3835**

Table of Contents

INTRODUCTION.....	1
METHODS.....	2
RESULTS.....	10
SUMMARY AND NEXT STEPS.....	13
REFERENCES.....	15
APPENDIX A: SME PANEL MEMBER BIOS.....	A-1
APPENDIX B: PROPOSED SECTION 2 INDICATORS MAPPED TO ORIGINAL INDICATORS	B-1

INTRODUCTION

The Screening of Passengers by Observation Techniques (SPOT) is the behavior detection program implemented by the Transportation Security Administration's (TSA's). The SPOT Program is housed within the Behavior Detection and Analysis (BDA) Program, part of the Threat Assessment Capabilities Branch of the Checkpoint Technologies Division in the Office of Security Capabilities (OSC). This program is unique from TSA's other layers of security because it uses behavior-based observation techniques to identify individuals who may pose a threat to aviation and/or transportation security.

At the core of the program, Behavior Detection Officers (BDOs), who are specifically trained on the SPOT approach, observe and assess passengers for certain pre-specified indicators—nonverbal, verbal, and physiological reactions that are thought to be associated with fear of discovery. The BDOs conduct operations primarily at security checkpoints, positioned where they can optimally observe travelers throughout the area as well as at stress points (e.g., approaching or near the travel document checker [TDC], canines, and/or explosive trace detection [ETD] swabs). In addition, BDOs can function as stress points themselves by engaging with passengers. Observing and interacting with passengers at checkpoints, BDOs are looking for behavioral patterns that are anomalous to the environmental baseline and may signal a need for further screening. Because behavior detection techniques are unobtrusive, threat agnostic, applied in real time, and free of large equipment, BDOs may implement these methods in a variety of settings and checkpoint configurations to help identify potentially high-risk travelers and route them toward a higher level of screening. The primary instrument that BDOs use in this process is the SPOT Referral Report, which lists the indicators of interest and is structured to reflect the SPOT process related to the identification of passengers for further screening.

In support of TSA's behavior detection capabilities, the American Institutes for Research (AIR) is engaged in a study to help BDA refine and optimize its behavior detection method. Focusing primarily on the SPOT Referral Report, the first step in optimization is possible refinement of suspicious indicators from Section 2 (Observation and Behavior Analysis), used to observe passengers waiting in line at the checkpoint. To do so, AIR developed a Summary Document (AIR Deliverable 2.1.2; AIR, 2013) that presents information on all indicators from Section 2 of the SPOT Referral Report. The document is a synthesis of the current indicators, operational definitions (descriptions and exemplars), and related research findings. In November 2013, AIR organized a two-day Subject Matter Expert (SME) Panel meeting, which brought together a group of SMEs with deep knowledge of behavior detection methods, threat assessment and the SPOT Program. Meeting participants included academic experts, operations personnel and select AIR staff. SME Panel members were presented with the Summary Document, which informed discussions around specific indicators, indicator and instrument utility, and how these might be refined to enhance program effectiveness. AIR subsequently analyzed and applied this feedback, developing a revised Section 2 indicator set.

This report describes AIR's efforts to date regarding indicator refinement and presents a revised Section 2 indicator list. First, in the *Methods* section, we present information on the SME Panel members: a description of materials developed for the two-day meeting, including the Summary Document; and an overview of the process used to examine and elicit input on the Section 2 indicators. Next, in *Results*, we present proposed changes to particular indicators and an organized framework of conceptual clusters that may be useful in BDO training on the new indicator set. Last, we discuss *Next Steps* in the indicator optimization process and how these preliminary results may inform larger SPOT Program evaluation efforts.

METHODS

This section provides an overview of methods used in the indicator optimization process to date. Here, we present the list of SME panel members as well as materials developed and processes followed during the two-day meeting.

Participants

The SME Panel included a diverse group of individuals with expertise in behavior detection, research methodology, and/or the SPOT Program. Exhibit 1 lists the panel members and their affiliations. Select AIR staff with expertise in the SPOT indicator list and process, analysis of SPOT operational data, and behavior observation/coding also participated.

Exhibit 1. SME Panel Members

Attendees	Affiliation
External Subject Matter Experts	
Susan Brandon, Ph.D.	Chief of Research, High Value Detainee Interrogation Group
Paul Ekman, Ph.D.	Professor Emeritus in Psychology at University of California, San Francisco
Christian Meissner, Ph.D.	Professor of Psychology at Iowa State University
Helene Mullaney, M.A.	Deloitte Consulting
Annalise Whittaker, M.Phil.	Defence Science and Technology Laboratory, United Kingdom
Transportation Security Administration	
Jennifer King Blanchard	TSA, Office of Security Capabilities, Threat Assessment Capabilities Branch
Patrick Burns	TSA, National Instructor, SPOT Program
Jon Carter	TSA, Expert Behavior Detection Officer, SPOT Program
Lori McCullough	TSA, Transportation Security Manager, SPOT Program
American Institutes for Research	
Tracy Costigan, Ph.D.	AIR, Principal Research Scientist, BDA Program Research Principal Investigator
Zodie Makonnen, M.Ed.	AIR, Senior Research Scientist, Indicator Optimization Task Leader
Tanya Taylor, Ph.D.	AIR, Research Analyst
Emily Baumann, M.A.	AIR, Research Associate
Michele Topf, B.A.	AIR, Research Associate
Note takers	
Luann Johnson, M.A.	AIR, Research Associate
Claire Bocage, B.A.	AIR, Research Assistant

For biographical sketches of SME Panel members, see Appendix A.

Materials

In preparation for the SME Panel meeting, AIR staff developed several documents to facilitate productive discussion and gather input on all 43 Section 2 indicators. Materials included a list of Section 2 indicators, a note-taking grid, and the Summary Document. The note-taking grid is included below, in the *Process* section. A description of the Summary Document is presented here.

Summary Document

As mentioned, the Summary Document functioned as a comprehensive record of all Section 2 indicator-specific information around which group discussions occurred during the panel meeting. We have included the introductory language from the Summary Document here to serve as an explanation of the various elements included for each indicator.

Introduction

The Summary Document serves as a reference tool that presents comprehensive, current and research-based information on suspicious indicators from the SPOT Referral Report. It is the primary document used in the ongoing indicator refinement process.

Below, we provide a guide to help the reader navigate the Summary Document. For each indicator, we present the same information in a standardized, two-page format. Here we lay out this format and provide background on sources of information and the significance of the analyses conducted.

Page 1: Indicator Information

The first page of each indicator-specific section presents information from TSA's SPOT Referral Report and the accompanying SPOT Behavioral Indicator Reference Guide (BDA, 2011). Each field and its corresponding description are listed here:

- **Indicator Label:** The indicator wording as it appears on the SPOT Referral Report.¹
- **Referral Report Section(s):** Lists of the section(s) where the indicator can be found on the SPOT Referral Report. In addition, if the indicator is part of Section 2, the type of factor (i.e., stress, fear, or deception) is listed.
- **Point Value:** The number of points assigned to the indicator when observed. (BDOs add point values for indicators exhibited by an individual and direct a passenger to additional screening if the sum exceeds an established threshold.)
- **Description:** The behavioral description or operational definition that corresponds to the

¹ This document references the SPOT Referral Report (Version 4.0; revised 23 February 2009). Since the release of this version, the SPOT Program has implemented two newer versions: (1) Version 3.0; revised 09 April 2013, implementation began in May 2013 and (2) Version 3.0; revised 15 November 2013. However, since operational data used in the updated analyses span 2006 through 2012, we reference Version 4.0 which was in use during this time. Despite the recent revisions, the content of the screening instrument (i.e., the suspicious indicators) for our purposes remain largely unchanged.

indicator label on the SPOT Referral Report. The SPOT indicator descriptions are part of a standardized manual meant to guide the BDO on assessing passenger points.

- *Assessable and Non-Assessable Exemplars:* Examples of instances in which the indicator may and may not be assessed. These are not comprehensive but meant to provide the BDO with relevant and common examples of how the indicator may look in the operational setting.

Exhibit 2 presents current indicator information used by the BDO Program, extracted from the SPOT Program's Behavioral Reference Guide (BDA, 2011).

Exhibit 2. Template of Indicator Label, Definition and Exemplars

Indicator Name	
Referral Report Section(s):	Point Value:
Section 2 Factor:	
Description	
Description of Indicator	
Assessable Exemplars	Non-Assessable Exemplars
Example 1	Example 1
Example 2	Example 2
	Example 3

Page 2: Research Evidence

The second page of each indicator-specific section presents results of various analyses from several different sources. From AIR's previous work on Project Hostile Intent (2005-2011), we draw on findings from the SPOT Validation Study (Costigan, Makonnen, Taylor, Sawyer, Myers, & Topf, 2011), analyses updated here to include operational data through 2012; a literature review on behavioral indicators of suicide attack, for which results were mapped to the SPOT Referral Report (Topf, Costigan, Makonnen, Baumann, & Mullaney, 2013); and preliminary results from interviews with SMEs and eyewitnesses to suicide attack (Makonnen, Topf, & Mullaney, 2010). We have also included findings from a workshop report on behavioral indicators of suicide attack identified through an examination of proxy crimes (DHS, 2011).

For each indicator, this second page consists of a multipart table, which presents results from these various analyses. Below is a brief description of each section of the table:

- **Frequency of Occurrence:** The percentage of time the particular indicator occurred, in proportion to all indicators observed, as well as the trend in indicator occurrence (up, down, stable). The reported results in this table section were updated from the SPOT Validation Study to include operational data from 2006 to 2012.
- **Ranks:** In the SPOT Validation Study analyses, the degree of variation in the use of indicators was examined across a set of stable setting characteristics (Year, Quarter, Location, and Hub Size). The indicators were ranked from most frequent to least frequent overall. This table also includes results of indicator use by hub size as one example of potential consistency or variation in indicator use. Hub sizes included in the analyses were Large, Medium, and Small. (Non-Hub Primary was excluded from analyses due to small sample sizes.) Ranks were designated into a quartile: quartile 1 (i.e., the 25% most frequently observed indicators); quartile 2 (the middle 50% of the indicators); and quartile 3 (25% least frequently occurring indicators). The reported results in this table section were updated from the SPOT Validation Study, to include operational data from 2006 to 2012.
- **Item-Level Predictive Utility:** The predictive utility of individual indicators was examined by calculating the association between the presence/absence of each SPOT indicator and the presence/absence of each of the four outcomes (*LEO Arrest*, *Possession of Prohibited/Illegal Items*, *Possession of Fraudulent Documents*, and the *Combined Outcome*). Significance tests that assessed the associations between indicators and outcomes were computed for each 2x2 table (i.e., each indicator x outcome pair). Corresponding Pearson's χ^2 values and significance tests were computed; in instances when the Pearson's χ^2 assumption (that minimum expected cell counts are greater than 5) was not met, Fisher's exact test statistics and significance levels were reported instead (Fisher, 1922).

Odds ratio (OR) statistics were also produced for each pair in order to describe the ratio of the odds of a positive outcome among those exhibiting a given indicator to the odds of a positive outcome among those not exhibiting a given indicator. Confidence Intervals (CIs) associated with each OR were also produced. Note that the analyses were one-directional and focused on positive ORs only, indicating the extent to which the presence of indicators increased the odds of a given outcome.

These analyses were conducted with stratified subsets (i.e., the Operational SPOT dataset was randomly split into two subsets, balanced by year). This allowed for an examination of stability in the results. In the tables, we present only results from the first subset to simplify the information presented. The reported results in this table section were updated from the SPOT Validation Study to include operational data from 2006 to 2012.

- **Factor Analysis:** As part of the SPOT Validation Study analyses, AIR also conducted an exploratory factor analysis (EFA) of the SPOT Referral Report Section 2 indicators. This analysis served as an initial step in the examination of construct-related validity. Results of the EFA produced a four-factor model, which appeared to represent four prototypical traveler profiles: *Nervous and Fidgety, but Otherwise Seemingly Unremarkable*; *Late and Hurried*; *Arrogant, Uncooperative, and Contemptuous*; and *Terrified*. Again, the EFA was conducted with stratified subsets (i.e., the Operational SPOT dataset was randomly split into two subsets, balanced by year). This allowed an examination of stability in the results. The results for the two subsets are presented in the summary table. Factor loadings greater than approximately .40 are considered strong; factor loadings between approximately .15 and .40 are considered moderate. Because the SPOT indicators are binary (i.e., presence/absence), for the purpose of this review the absolute magnitude of a factor is more important than the direction of the loading (i.e., positive/negative). Factor analysis results in this table are based on 2006 to 2010 Validation Study data only.

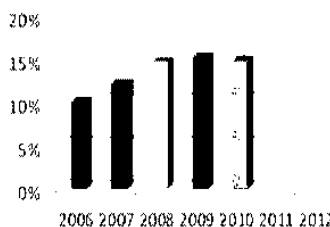
It is interesting to note that two of these factors correlated significantly to the SPOT Validation Study outcomes. Specifically, higher scores on Factor 3 (*Arrogant, Uncooperative, and Contemptuous*) were associated with positive findings on all four study outcomes (*LEO Arrest*, *Presence of Serious Prohibited/Illegal Items*, *Presence of Fraudulent Documents*, and the *Combined Outcome*). In addition, lower scores on Factor 4 (*Terrified*) were associated with three study outcomes (*Presence of Serious Prohibited/Illegal Items*, *Presence of Fraudulent Documents*, and the *Combined Outcome*) whereas higher scores on Factor 4 were associated with *LEO Arrest*.

- **Relationship to Pre-incident Suicide Attack Indicators:** Presence of the indicator in the AIR literature review on behavioral indicators of suicide attack was listed as the percentage of times an indicator appeared in the overall findings, with the rank of 1 signifying that the indicator appeared the most in the overall findings.
- **Presence in SME and Eyewitness Interviews:** Information that is based on a preliminary review of data from interviews with 12 Israeli SMEs and four eyewitnesses. Behavioral indicators of suicide attack mentioned by participants were mapped to indicators on the SPOT Referral Report. Presence of the SPOT indicator in interview data was noted with a "yes," and absence of the SPOT indicator in interview data (i.e., no mention) was noted with a "no."
- **Presence in SME Workshop:** Information that is based on an SME workshop on indicators of suicide attack identified through an examination of proxy crimes (DHS S&T, 2011). Behaviors identified were mapped to indicators on the SPOT Referral Report to the extent possible. Mention of a behavior exhibited by suicide attackers that was also a SPOT indicator was noted with a "yes" no mention of a particular SPOT indicator was noted with a "no."

Exhibit 3 presents a sample table of research evidence, similar to that included for each indicator in the Summary Document.

Exhibit 3. Sample Research Evidence Table

Research Evidence

Legend	Indicator Name (BEH00)					
How frequently is this indicator used?	Frequency of Occurrence					
	Average frequency of occurrence across years	14%				
	Trending					
	Ranks					
	Quartile rank across Years	1	Quartile Rank Information 1 = top 25% 2 = interquartile (middle 50%) 3 = bottom 25%			
	Rank by Hub Size - Small	1				
	Rank by Hub Size - Medium	1				
	Rank by Hub Size - Large	1				
How well does this indicator help BDOs identify dangerous or illegal activities?	Item-level Predictive Utility					
		Odds Ratio				
		Lower Bound	Upper Bound		Sig.	
		To Serious Prohibited or Illegal Items	0.81		1.01	NS
		To Fraudulent Documents	0.75		0.96	<.01
		To LEO Arrest	0.96		1.39	NS
How does this indicator group with other indicators?	Factor Analysis					
		Factor Loadings			Notes	
		Subset 1	Subset 2	Best Fit		
		Nervous and Fidgety (but Otherwise Seemingly Unremarkable)	0.15	0.10		-
		Late and Hurried	0.44	-0.46		-
		Arrogant, Uncooperative, and Contemptuous	0.27	0.28		Yes
		Terrified	-0.02	-0.01		-
Has this indicator been examined in research or identified by experts as important?	Relationship to Pre-incident Suicide Attack Indicators					
	Presence in Literature Review	0.10%	Rank # 31			
	Presence in SME and Eyewitness Interviews	No				
	Presence in SME Workshop	No				

Process

In preparation for the SME Panel meeting, AIR developed a process to structure the two-day meeting and maximize productivity. Again, the goal was to foster rich discussion and gather members' input on all 43 Section 2 indicators.

Panel members were divided into two working groups. Each group had a mix of research and operations-oriented SMEs to encourage productive discussion where multiple viewpoints were considered. During the first day, the majority of the time was devoted to three rounds of collaborative breakout sessions: 90-minute blocks where each working group discussed a particular set of five to eight indicators and provide recommendations on whether to remove or retain each indicator. If the group decided to retain an indicator, members note whether changes should be made to any part(s) of the indicator itself (e.g., label, operational definition, description, exemplars).

To facilitate the group discussion, working groups were given instructions on how to systematically provide recommendations for their assigned indicators (see Exhibit 4 for the template). The process is described here:

- Step 1. Select one:
 - Remove
 - Retain as is
 - Retain with changes*
- *Step 1a. If selected *Retain with changes*, select all that apply:
 - Combine
 - Separate/split
 - Revise indicator name
- Step 2. Detail changes and indicate relative importance (optional) – Select further changes that apply. If you have background knowledge or opinions on the importance or utility of a particular indicator in identifying someone who is trying to deceive, please indicate this here. If you do not have strong feelings about this, feel free to leave it blank.

Detail Changes

- Revise indicator definition
- Revise accessible exemplar(s)
- Revise non-accessible exemplar(s)

Relative Importance

- High
- Medium
- Low

Following each breakout session, all members reconvened to present an overview of their indicator set, explain decisions made, and bring up any issues or questions

for discussion among the whole group. Discussion during both the breakout and plenary sessions were captured by AIR note takers for later analysis and to inform AIR's recommended changes to the Section 2 indicators. As mentioned previously, note takers completed a pre-developed grid for each indicator discussed, as seen in Exhibit 4.

Exhibit 4. Indicator-Specific Note-Taking Grid

#	INDICATOR LABEL		
Step 1. Select one		X	Notes
Remove			
Retain as is			
Retain with changes*			
*Step 1a. If selected <i>Retain with changes</i>, select all that apply and insert notes			
Combine			
Separate/split			
Revise indicator name			
Step 2. Detail changes and indicate relative importance (OPTIONAL)			
Revise indicator definition			
Revise accessible exemplar			
Revise inaccessible exemplar			
Relative Importance			
Low			
Medium			
High			

Following the SME Panel meeting, AIR analyzed and processed the information presented and the conclusions drawn to develop a preliminary indicator list. This preliminary indicator list was presented to TSA threat assessment/behavior detection experts for review and comment. This feedback from the TSA experts was incorporated into the development of the proposed final version of the revised indicator list.

RESULTS

As a result of panel work, the proposed new list includes 27 indicators organized into seven clusters. These clusters are designed to organize the indicators into groups of related constructs and will serve as a heuristic to ease the cognitive workload of BDOs during behavioral observation. These clusters will also help structure BDO training because the indicators can be presented in the groupings of related concepts. The clusters follow:

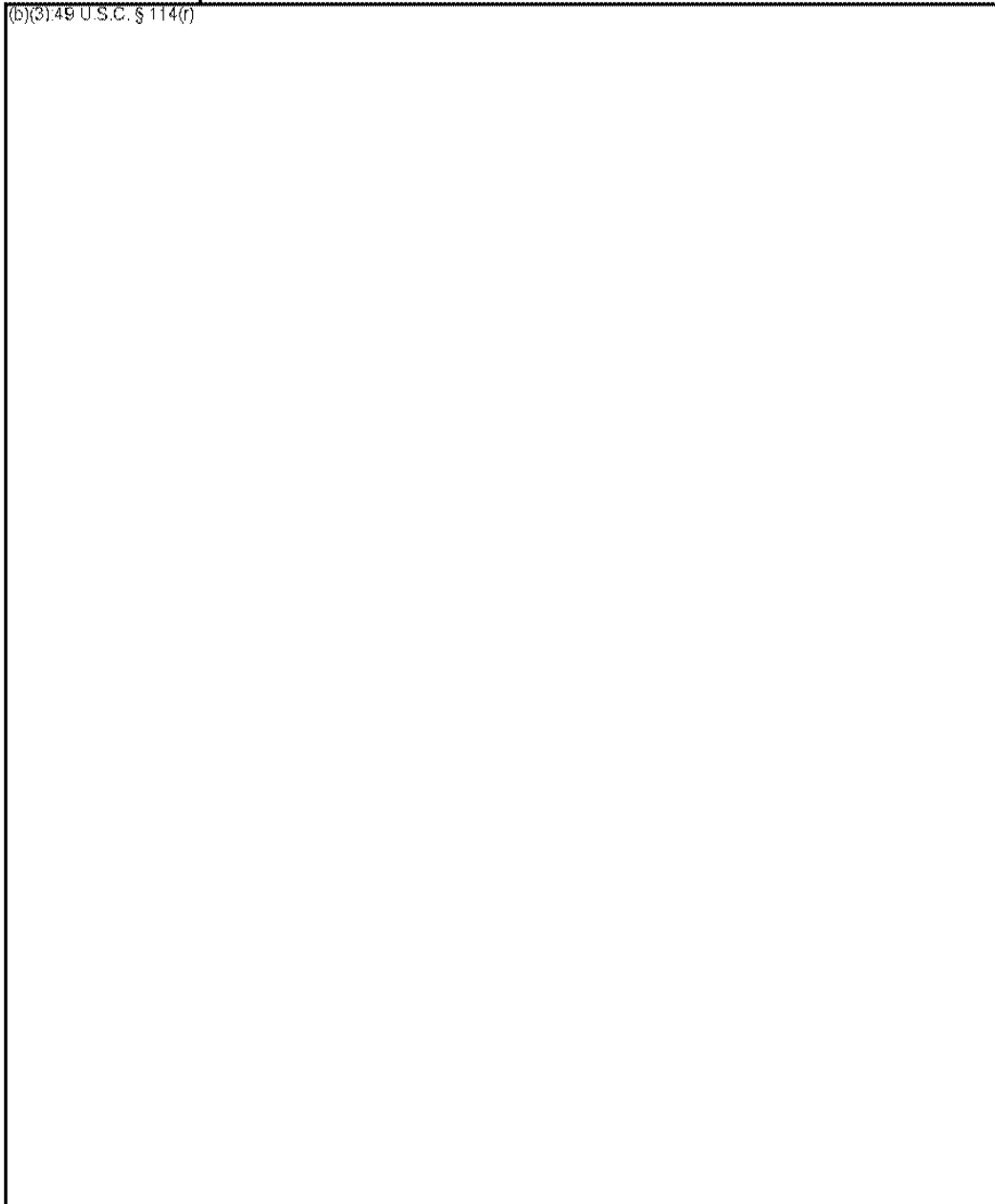
(b)(3).49 U.S.C. § 114(r)

Unlike the current indicators on the SPOT Referral Reports—stress, fear, and deception factors—that serve as a weighting scheme with differential points assigned to each factor, the new indicator clusters do not represent particular scoring approaches. Indicator weights and scoring will be considered in later phases of the optimization process.

Exhibit 5 shows the proposed Section 2 indicator set organized by clusters. Appendix B includes a crosswalk of the new clusters, new indicator labels that fit within each, and the original indicators on which these were based. Indicator labels were carefully crafted to ensure standardization of terms across indicators, and precise wording was selected to represent the concepts as discussed in the SME Panel meetings. For example, each indicator that refers to behavioral changes around stress points is labeled “... near stress point.” The associated operational definitions will then describe the term “*near stress point*” to represent behavior as the passenger is approaching, at, interacting with, or immediately after stress point). In addition, many indicator labels that used to include the verb form of *displays* have been changed to “Behavior signals...” because this was thought to be a more precise wording that can be more readily operationally defined. In addition, the SME Panel tried to minimize the use of subjective terms such as *excessive* and *repetitive*; however, in some instances these words could not be avoided. These subjective terms will be carefully addressed and precisely defined in the updated operational definitions of the Behavioral Reference Guide (BDA, 2011) to minimize subjectivity.

Exhibit 5. Proposed Section 2 Indicators

(b)(3) 49 U.S.C. § 114(r)



The two indicators with an asterisk in Exhibit 5 require further consideration and discussion to address concerns about the wording stemming from the BDA's review. In the first indicator,

(b)(3) 49 U.S.C. § 114(r)

concern was expressed about the use of the word "(b)(3) 49 U.S.C. § 114(r)." A recommendation was made to change it to

something that BDOs will better understand to ensure that passengers are selected only when there is a deviation from their baseline (b)(3):49 U.S.C. § 114. In the second, the issue was about the full label, (b)(3):49 U.S.C. § 114(r) again because of concerns about selection for acceptable individual variation. The AIR research team and BDA, in conjunction with SME Panel members, will continue to work on these two indicator labels.

It is important to note that certain Section 2 indicators are repeated in the SPOT Referral Report Section 4 (Signs of Deception), Section 5 (Possible Suicide Bomber Cluster), and Section 6 (Possible Surveillance Activity). For example, an element of the Section 2 indicator (b)(3):49 U.S.C. § 114(r) is repeated in Section 4 in (b)(3):49 U.S.C. § 114(r). During the current optimization effort, the primary focus was on Section 2 only; however, the overlap across sections was acknowledged. This will be given further consideration during refinement of the other sections as well. In particular, Section 5 indicators were considered during optimization, and the mapping of several of these indicators to the new indicator set is included in Appendix B. A full review of all indicators in all sections will be completed during the next phase of optimization with the goal of having no overlap across sections.

Removal from Referral Report Section 2

Of the 43 original Section 2 indicators, the SME Panel recommended the removal of only one: (b)(3):49 U.S.C. § 114(r) (BEH7). In addition, the panel recommended that two indicators be removed from Section 2 and placed into Section 5 (Possible Suicide Bomber Cluster). Exhibit 6 also summarizes these changes. The SPOT Referral Report Section 5 (Possible Suicide Bomber Cluster) will be addressed more completely in later indicator optimization work.

Exhibit 6. Indicators to Drop or Move

BEH#	Original Indicator Label	Recommendation
(b)(3):49 U.S.C. § 114(r)		

At this stage of the optimization effort, the team has focused on the indicator labels-aiming for clear, precise, and standardized wording. As part of the next phase of optimization, indicator operational definitions and exemplars will be finalized on the basis of the recommendations of the SME Panel meeting and TSA stakeholders.

SUMMARY AND NEXT STEPS

As described above, the goal of this task was to optimize the set of Section 2 indicators, using a structured and standardized methodology with input from the SME Panel and TSA/BDA program leadership. The results of the SME Panel meeting in November 2013 reduced the current set of 43 Section 2 indicators to 27 indicators. Only one indicator was recommended for complete removal from the behavior detection process and two were removed from Section 2 and moved into the category of automatic LEO notification for possible suicide bombing indicators. In addition, discussions about optimization of other indicators, process optimization, and training development began during the SME Panel meeting.

The results presented above include the new set of proposed Section 2 indicator labels. Indicator labels were crafted to be clear, concise, precise, and standardized. In the next phase of the optimization work, each new indicator's operational definitions (i.e., descriptions and exemplars) will be further refined to ensure that all recommended SME Panel changes are captured in revised training materials. The resulting operational definitions will be precise and specific with the goal of achieving reliable coding by BDOs trained and proficient in the indicator set. By the end of Year 1 (February 2014), AIR anticipates that Section 2 indicator label wording will be finalized and the associated operational definitions and exemplars will be in draft form and usable for pilot testing.

Sharing Refined Indicators with Operational Staff

Because most of the new indicators in the refined set represent one or more of the original SPOT indicators (as shown in Appendix B), the operational definitions (i.e., descriptions and exemplars) will be substantially changed to develop more precision, clarification, and standardization for a revised Behavioral Reference Guide. To avoid confusion, we recommend that only the new indicator list be shared with BDOs, not the linkages to the old indicators. In addition, BDOs in the field should view this revised indicator set along with the revised Behavioral Reference Guide only when it is completed. If BDOs are given the new indicator list without the definitions, they will likely make assumptions made about the meaning and use of the labels and possibly have concerns about the "missing" indicators (which, in fact, are really combined with other indicators). Thus, AIR strongly emphasizes the importance of training on the new indicator definitions and careful pilot testing and rollout of the revised procedures.

In addition, we recommend that BDOs have the opportunity to provide feedback on the new indicator set during the pilot test phase of the optimization work. BDOs should be allowed to anonymously provide positive and negative feedback about indicators, processes, and changes to referral patterns that may occur as a result of implementation of the new indicator set. TSA should additionally consider whether more formalized, although still confidential, feedback should be collected through interviews or focus groups.

Further Indicator and Process Optimization

In addition to SPOT Referral Report Section 2 optimization, it is anticipated that further behavior detection indicator and process optimization activities will occur by February 2014. The goal is to produce a fully refined behavior detection process that fits into evolving checkpoint configurations and procedures. To that end, further optimization activities will include review and refinement of indicators in SPOT Referral Report Sections 4 (Signs of Deception) and Section 5 (Possible Suicide Bomber Cluster). Process optimization will also be considered and include refinement related to Section 6 (Possible Surveillance Activity) and Section 7 (Auto LEO notification), as well as evaluating reweighting indicator values, changing decision thresholds, and determining which information should be included on the revised SPOT Referral Report. Using the same method and procedures for refinement, including SME Panel input, available operational data, and related threat assessment research findings, AIR will ensure that the result of this work will be a fully refined behavior detection process. Once accomplished, the refined process can be tested in the field and further optimized as new operational and test and evaluation data are collected.

REFERENCES

- American Institutes for Research. (2013). *Summary document for review of suspicious indicators*. Washington, DC: Author.
- Behavior Detection and Analysis Program. Transportation Security Administration. (2011). *Behavioral indicator reference guide*. Washington, D.C.: Author.
- Costigan, T. E., Makonnen, Z. E., Taylor, T. S., Sawyer, K., Myers, T. L., & Toplitz, M. (2011). *SPOT referral report validation study final report: Volumes 1-4*. Washington, DC: American Institutes for Research.
- Department of Homeland Security Science and Technology Directorate. (2011). *Workshop report: Practitioner-based behavioral indicators*. Washington, DC: Author.
- Fisher, R. A. (1922). On the interpretation of χ^2 from contingency tables, and the calculation of P. *Journal of the Royal Statistical Society*, 85, 87-94.
- Makonnen, Z. E., Toplitz, M., & Mullaney, H. A. (2010). *Preliminary review of interview data from Israeli subject matter experts and eyewitnesses*. Washington, DC: American Institutes for Research.
- Toplitz, M., Costigan, T. E., Makonnen, Z. E., Baumann, E., & Mullaney, H. A. (2013). *Updated literature review of pre-incident indicators of suicide attack*. Washington, DC: American Institutes for Research.

~~Sensitive Security Information (SSI)~~

APPENDIX A: SME PANEL MEMBER BIOS

A-1



~~Sensitive Security Information (SSI)~~

IF ANY PART OF THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 C.F.R. PARTS 15 AND 1520, NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW" AS DEFINED IN 49 C.F.R. PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE DEPARTMENT OF TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTIES OR OTHER ACTION. FOR U.S. GOVERNMENT AGENCIES, PUBLIC DISCLOSURE GOVERNED BY 5 U.S.C. 552 AND 49 C.F.R. PARTS 15 AND 1520.

Susan E. Brandon, Ph.D.

Dr. Susan E. Brandon is Chief of Research for the High Value Detainee Interrogation Group, a multiagency group formed by Executive Order 13491 (Ensuring Lawful Interrogations). She previously served as Chief for Research of the Behavioral Science Research Program at the Defense Intelligence Agency (Department of Defense [DoD]), which focused on evidence-based methods to support Human Intelligence and Counterintelligence operations, analyses and investigations. Previously, she was at the National Institutes of Health, Office of Science and Technology Policy and Visiting Scientist at the American Psychological Association. She spent 15 years as a faculty member of the Department of Psychology (Behavioral Neuroscience) at Yale University, where her primary research interests were the development and evaluation of real-time, computational models of learning and behavior.

Paul Ekman, Ph.D.

With more than 100 articles published, and several honorary doctoral degrees in addition to his own distinguished 50-year academic career, Dr. Paul Ekman, Professor Emeritus in Psychology at the University of California—San Francisco, is the researcher and author best known for furthering our understanding of human facial and gestural expression. A pre-eminent psychologist and codiscoverer of microexpressions with Friesen, Haggard, and Isaacs, Dr. Ekman was named one of the most influential psychologists in the 20th century by the American Psychological Association and one of the 100 most influential people in the world in 2009 by *TIME Magazine*.

Christian Meissner, Ph.D.

Dr. Christian Meissner is Professor of Psychology at Iowa State University. He holds a doctorate in cognitive and behavioral science from Florida State University (2001) and conducts empirical studies on the psychological processes underlying investigative interviews, including issues surrounding source/witness recall and identification, deception detection, and interrogations and confessions. He has published numerous peer-reviewed journal articles and book chapters, and his research has been funded by the National Science Foundation (NSF), the U.S. Department of Defense (DoD), the U.S. Department of Justice (DoJ), and the U.S. Department of Homeland Security (DHS). He has served on advisory panels for the NSF, the National Academy of Sciences, DoD, and DHS, and currently serves on the editorial board of several prominent academic journals. From 2010 to 2012, he served as Program Director of Law & Social Sciences at the NSF. In 2008, Dr. Meissner received the Saleem Shah Award for Early Career Excellence in Psychology and Law from the American Psychology-Law Society and the American Academy of Forensic Psychology. In 2011, Drs. Meissner and Lassiter were awarded the American Psychology-Law Society Book Award and the American Publisher's PROSE Award for Professional and Scholarly Excellence in Psychology for their edited volume, *Police Interrogations and False Confessions: Current Research, Practice, and Policy Recommendations*. Most recently, Dr. Meissner received the 2013 Academic Excellence Award from the International Investigative Interviewing Research Group.

Helene Mullaney, M.A.

Ms. Helene Mullaney, from Deloitte Consulting LLP, has over 24 years of professional experience conducting behavioral analyses in applied settings. Since 2000, her work has focused on identifying patterns of terrorist targeting and threat behaviors in support of security operations. She designed and led a multimethod, multidata collection effort to identify and validate predetonation suicide attack indicators, which included interviewing world-renowned subject matter and security experts. She has 4 years of experience conducting training needs analysis and training evaluation for intelligence community and DoD clients and currently provides process improvement support to an intelligence agency.

Annalise Whittaker, M.Phil.

Dr. Annalise Whittaker has worked in the area of counterterrorism for 7 years at the Defence Science and Technology Laboratory (Dstl). Previous to that, she spent 8 years in academia working in the field of human memory, including conducting depression and suicide assessments of patients in the National Health Service in support of a large clinical trial. Dr. Whittaker has been the Human Factors Liaison to the Department for Transport for 6 years and advises the analysis and development team that coordinates counterterrorism research and applied research across all modes of transport. She leads a wide range of research projects in support of UK defense and security but has a particular interest in applying clinical psychology and evidence-based experimental approaches to the issue of human behaviors in counterterrorism. Dr. Whittaker has an M.Phil. in cognitive neuroscience.

Transportation Security Administration (TSA)

Jennifer King Blanchard, M.A.

Ms. Jennifer King Blanchard is the Behavior Detection and Analysis Lead within the Threat Assessment Capabilities Branch of the Office of Security Capabilities at the Transportation Security Administration (TSA). She joined TSA in 2009, first as the Training Manager and then as the Branch Chief for the Strategic and Technical Branch. Currently, her role centers on building a research foundation for behavior detection capabilities in the aviation environment. Prior to coming to the TSA, Ms. King worked at the U.S. Naval Research Laboratory (NRL) as an Engineering Research Psychologist in the Adversarial Modeling and Simulation Branch. While there, she worked closely with DHS's Science and Technology Directorate on various elements of Project Hostile Intent (PHI), including data collection, sensor evaluation, literature reviews, and the development of micro expression training and animation tools. She also served on the Behavior Representation in Modeling & Simulation conference committee for 4 years during her time at the NRL. She holds an M.A. in industrial organization psychology and a B.S. in criminal justice from East Carolina University.

Patrick Burns

Mr. Patrick Burns has been working for the TSA since 2006. In 2008 he began working as a Behavior Detection Officer (BDO) in the Screening of Passengers by Observation Techniques (SPOT) Program. Mr. Burns was involved in several pilot programs and studies within the SPOT Program, including the Validation Study, BDO hiring process study, and the Decision Gates program. Since October 2011, he has been a National Instructor for the SPOT Program and has been involved with curriculum, training material, and On-the-Job (OJT) process reviews and development.

John Carter

Mr. John Carter has been working for the Transportation Security Administration since 2002. He worked as a Screener, Lead Screener and Screening Supervisor until being laterally promoted to an Expert Behavior Detection Officer. While working as a screener Mr. Carter was trained and provided training to perform dual function screening operations. He co-developed an in-house mentoring system for mentors and newly trained TSO's. In the spring of 2005 John was selected to participate in the PASS program which is now SPOT. Mr. Carter was among the first selected and hired to be ETSO-BDO and BDO instructor. He was a member of the National Training team from October 2006 until February 2012. Mr. Carter currently works at Portland International Airport (PDX) and routinely provides support for Head Quarter initiatives.

Lori McCullough

Ms. Lori F. McCullough is a SPOT Transportation Security Manager at Salt Lake City International Airport (SLC). Previously, she served as a Supervisory Transportation Security Officer at SLC from February 2003 to April 2007. Before that she served as a Lead Transportation Security Officer at SLC. Ms. McCullough came to the TSA in September 2002. She served on the Surge Capacity Force in New York City from November to December 2012, supporting the efforts of the Federal Emergency Management Agency after Hurricane Sandy. Prior to joining TSA, Ms. McCullough served in retail and direct sales as branch/division manager.

American Institutes for Research

Tracy Costigan, Ph.D.

Dr. Tracy Costigan, Principal Research Scientist at AIR, has nearly 20 years of experience in behavioral science research. Technical areas of focus include research design, quantitative methodology, predictive modeling, test development and validation, training evaluation, survey design, behavioral measurement, and large-scale data analysis. Research areas include workforce and national security issues, behavioral analysis, mental health, and education. Dr. Costigan served as Principal Investigator for PHI (2005-2011), which was jointly funded by the NRL and DHS's Science and Technology Directorate (DHS S&T). In this capacity, Dr. Costigan provided project direction for all tasks, interacting with clients and Government representatives. Related to the SPOT Program, Dr. Costigan developed the methodology for and led the implementation of the SPOT Validation Study as well as led the data analysis effort. She has briefed the study to the project's independent review panel as well as to the TSA, the DHS, and the U.S. Government.

B-3



~~Sensitive Security Information (SSI)~~

WARNING: THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 C.F.R. PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW" AUTHORITY UNDER 49 C.F.R. PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADMINISTRATOR OF THE TRANSPORTATION SECURITY ADMINISTRATION OR THE SECRETARY OF TRANSPORTATION. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTIES OR OTHER ACTION FOR U.S. GOVERNMENT AGENCIES. PUBLIC DISCLOSURE GOVERNED BY 5 U.S.C. 552 AND 49 C.F.R. PARTS 15 AND 1520.

Accountability Office. As Principal Investigator, she also led work on the Identification of Suicide Attack Indicators, a study that involved conducting semistructured interviews with subject matter experts (SMEs) and eyewitnesses to suicide attacks. Her PHI work also included developing complex statistical models of nonverbal indicators of deception; developing knowledge tests to evaluate BDOs in a supplemental training course; conducting literature reviews on suicide attack indicators, the casual conversation interview approach, and cross-cultural factors in deception detection; and developing standardized definitions of SPOT indicators to support training development. In 2011, Dr. Costigan was invited to serve on a SME Panel for TSA to discuss the design of microexpression training for Transportation Security Officers (TSOs). She recently published a book chapter on validation methods for security measures in *Evidence-Based Counterterrorism Policy* (2012), part of the Springer Series on Evidence-Based Crime Policy. Dr. Costigan holds a Ph.D. in

Zodie Makonnen, Ed.M.

Ms. Zodie Makonnen, Senior Research Analyst at AIR, has over 20 years of experience in program evaluation and research. Most recently, Ms. Makonnen served as Deputy Project Director for PHI and played a central role in the SPOT Validation Study and the Identification of Suicide Attack Indicators tasks. Responsibilities included developing and refining behavior-based measures of deception and hostile intent through the development of in-depth interview protocols for qualitative interviews with SMEs; conducting interviews and focus groups with a variety of respondents; and conducting extensive literature reviews on a range of issues related to deception and hostile intent. Currently, she serves as Project Director for a grant that involves the independent evaluation of a classroom-based teacher performance evaluation system. Specific project activities include developing evaluation designs and appropriate data collection measures, including surveys and observation, interview, and focus group protocols. Ms. Makonnen holds an Ed.M. in education from Harvard University.

Tanya Taylor, Ph.D.

Dr. Tanya Taylor, Research Analyst at AIR, has over a decade of experience in the arena of legal psychology, including research related to interviewing techniques, interrogations, deception detection, false confessions, and judicial decision making. She has program evaluation and field and laboratory research experience and has had ample training in research design and methodology and advanced statistical procedures. Dr. Taylor led the PHI Deception Modeling team, engaging in fundamental research on deception detection using facial expression and body movement data and applying innovative statistical methodology. In addition, she was a senior staff member for the SPOT Validation Study, involved in data analysis, design, and implementation. Dr. Taylor holds a Ph.D. in human behavior and organizations, with an emphasis in legal psychology, from the University of Texas at El Paso.

Emily Baumann, M.S.

Ms. Emily Baumann, Research Associate at AIR, has been involved in DHS- and TSA-sponsored research since 2008. She has supported PHI in the past by assisting the behavioral analysis team with data preparation, conducting statistical analyses, coding and synthesizing qualitative data, conducting unclassified and classified literature reviews related to behavioral

indicators of suicide attack, collecting data through site visits and monitoring other data collectors, and contributing to reports. Ms. Baumann has worked for the last several years on conducting strategic job analyses and supporting program evaluations and behavioral analyses. Additional research responsibilities have included organizing and conducting SME focus groups and interviews, collecting observation data, contributing to technical reports, and maintaining project budgets and monthly client reports. Ms. Baumann holds an M.S. in applied sociology from Clemson University.

Michele Toplitz, B.A.

Ms. Michele Toplitz, Research Associate at AIR, has been involved in DHS- and TSA-sponsored research since 2005. Most recently, she served as a member of the SPOT Validation Study team; her involvement included developing data collection procedures for BDOs, conducting airport monitoring visits, and analyzing results for the final report. Ms. Toplitz was also an integral part of the PHI Identification of Suicide Attack Indicators task. Participation included developing interview protocols and training guides and conducting literature reviews on behaviors of suicide attackers with respect to the SPOT indicators. As part of the BDO Selection System Development project, she administered pilot and field tests with BDOs at a number of U.S. airports. Certified in the Facial Action Coding System (FACS), Ms. Toplitz applied this expertise to coding experimental video data and in support of TSA's development of a supplemental training course for BDOs. Ms. Toplitz holds a B.A. in anthropology/sociology and Spanish from Lafayette College.

~~Sensitive Security Information (SSI)~~

APPENDIX B: PROPOSED SECTION 2 INDICATORS MAPPED TO ORIGINAL INDICATORS

B-1



~~Sensitive Security Information (SSI)~~

THIS RECORD CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 C.F.R. PARTS 15 AND 1520. NO PART OF THIS RECORD MAY BE DISCLOSED TO PERSONS WITHOUT A "NEED TO KNOW," AS DEFINED IN 49 C.F.R. PARTS 15 AND 1520, EXCEPT WITH THE WRITTEN PERMISSION OF THE ADDRESSEE. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL, CRIMINAL, OR OTHER ACTION FOR U.S. GOVERNMENT AGENCIES. PUBLIC DISCLOSURE GOVERNED BY 5 U.S.C. 552 AND 49 C.F.R. PARTS 15 AND 1520.

Exhibit A-1.1. Proposed Section 2 Indicators Manned to Original Indicators

(b)(3) 49 U.S.C. § 114(i)

B-1



WARNING: THIS INFORMATION IS UNCLASSIFIED SECURITY INFORMATION THAT IS CONTROLLED UNDER 49 C.F.R. PARTS 15 AND 1520. NO PART OF THIS INFORMATION IS TO BE DISCLOSED TO PERSONS WITHOUT THE AUTHORITY OF THE SECRETARY OF THE DEPARTMENT OF HOMELAND SECURITY. DISCLOSURE OF THIS INFORMATION TO ANY OTHER PERSON WITHOUT THE AUTHORITY OF THE SECRETARY OF THE DEPARTMENT OF HOMELAND SECURITY IS PROHIBITED BY 49 U.S.C. 1520 AND 49 C.F.R. PARTS 15 AND 1520.

NEW Indicator Label	Original	Original Indicator Label and Notes
(b)(3)/49 U.S.C. § 114(f)		

8-2



(b)(3)49 U.S.C. § 114(f)

