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ARGUS EDS Human Factors System Qualification Test and Evaluation Plan

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Federal Aviation Administration
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Atlantic City International Airport, NJ 08405

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Test and Evaluation Plan

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16. Abstract

This test and evaluation plan outlines the human factors system qualification testing (SQT) that will be conducted for ARGUS Explosive Detection Systems that have achieved FAA certification. During the system qualification testing, human factors personnel will determine if each ARGUS system meets the requirements identified in the ARGUS specification document. The human factors requirements include the areas of machine operability, state controls and displays, alarm resolution controls and displays, documentation, bag control, and training. The requirements will be verified using formal testing, informal testing, and visual inspection. Human factors personnel will compile a detailed report of the results of the human factors requirements testing for each ARGUS system and assign a Green (Meets Requirement), Red (Does Not Meet Requirement), or White (Insufficient Data) rating to each of the requirements. These ratings will then be compiled into a final report that will be reviewed by the ARGUS SQT Configuration Control Board (CCB). The CCB will then weigh the criticality of the Red ratings and make a final decision about system success or failure.

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EXECUTIVE SUMMARY

This test and evaluation plan outlines the human factors system qualification testing (SQT) that will be conducted for ARGUS Explosive Detection Systems that have achieved FAA certification. During the system qualification testing, human factors personnel will determine if each ARGUS system meets the requirements identified in the specification document. The human factors requirements include the areas of machine operability, state controls and displays, alarm resolution controls and displays, documentation, bag control, and training. The requirements will be verified using formal testing, informal testing, and visual inspection. For the formal testing, 10 certified security screeners will be trained to operate each ARGUS system. Seven of the 10 trainees must pass the classroom final exam and at least five of those seven trainees must pass an operator-qualifying test to continue in the human factors assessment of effective throughput and operator alarm resolution performance.

In the human factors assessment, operators' alarm resolution performance for threat and non-threat alarm bags will be measured, as will the time it takes them to resolve alarm bags and to clear jammed bags. These trainees will also participate in some informal testing of the controls and displays. Human factors engineers will conduct informal testing and visual verification of required controls and displays, documentation, and training independent of the formal testing with operators. Based on these tests, each ARGUS system will receive a Green (Meets Requirement), Red (Does Not Meet Requirement), or White (Insufficient Data) rating for each of the human factors requirements assessed. These ratings will then be compiled into a final report that will be reviewed by the ARGUS SQT Configuration Control Board (CCB). The CCB will then weigh the criticality of the Red ratings and make a final decision about system success or failure.

ACRONYMS

ASTM	American Society for Testing and Materials
CAPPS	Computer-Assisted Passenger Pre-screening System
CCB	Configuration Control Board
COIC	Critical Operational Issues and Criteria
d′	Sensitivity
EDS	Explosive Device System
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FRE	Flesch Reading Ease
HF	Human Factors
HFE	Human Factors Engineer
ICF	Informed Consent Form
IED	Improvised Explosive Device
MOP	Measure of Performance
OJT	On-the-Job Training
OQT	Operator Qualification Test
OUE	Operational Utility Evaluation
Pcr	Probability of a Correct Rejection
Pd	Probability of Detection
Pm	Probability of a Miss
Pfa	Probability of a False Alarm
SEIPT	Security Equipment Integrated Product Team
SQT	System Qualification Testing
TEP	Test and Evaluation Plan
TEMP	Test and Evaluation Master Plan
WJHTC	William J. Hughes Technical Center

1. INTRODUCTION

Federal Aviation Regulations (FAR) §108 requires all air carriers in the United States to provide for the safety of passengers and their property. To comply, air carriers procure equipment and train personnel to screen passengers and their baggage before they board an aircraft. In addition to using X-ray technology to screen carry-on baggage at the checkpoints, air carriers use Explosives Detection Systems (EDSs) to screen checked baggage of passengers who are selected by the Computer-Assisted Passenger Pre-Screening System (CAPPS). While many large airports currently use EDSs to screen checked baggage, the goal of the Federal Aviation Administration (FAA) is to implement the use of EDSs to screen CAPPS-selected baggage for all commercial airline flights in the United States by 2004. Moreover, the extended goal of the FAA is to begin phasing in 100-percent checked baggage screening for all commercial airline flights by 2009.

1.1 Background

Currently, there are five FAA-certified EDSs that are commercially available. InVision Technologies, Inc., manufactures the CTX 5500 DS™, CTX 2500 DS™, and CTX 9000 DSi™. L-3 Communications Corporation manufactures the eXaminer 3DX™ 6000 and eXaminer 3DX™ 6000 SE. The predominant system in use at airports is the CTX 5500 DS™. With the exception of the CTX 2500 DS™, these systems are very expensive to procure and their considerable size often makes it difficult to integrate them into existing airport environments.

The FAA, working with the aviation industry, encourages the development of new technology and equipment to improve aviation security for the traveling public. To help meet the goals set forth for the year 2004 and beyond, the FAA established the ARGUS Program. In the first phase of this grant process, grants were awarded to six of the eight vendors who responded to a solicitation for preliminary designs of a low-cost EDS with a smaller footprint and lower throughput. Based on the performance of the vendors during the first phase, only three of the six vendors were awarded follow-on grants.

Because the ARGUS systems will be smaller and less expensive than traditional EDSs, airports with low volume and/or limited available floor space will be able to install these systems and implement checked baggage screening cost effectively. The Grantees include InVision Technologies, L-3 Communications Corporation, and PerkinElmer Instruments. Following development, each Grantee's ARGUS system (or one provided by another Offeror) will be subjected to certification testing [1]. Each system that achieves certification will also undergo extensive System Qualification Testing (SQT) to evaluate whether it meets the requirements specified in the ARGUS Program solicitation [2, appendix A]. Human factors (HF) testing, in accordance with FAA Order 1810.1F, Major Acquisitions, paragraph 1-10i [3], will be a part of this SQT.

1.2 Purpose

The purpose of this document is to outline the methods that will be used to complete the FAA HF SQT for each ARGUS system once it has achieved FAA certification. The overall test plan

for the ARGUS SQT and the test plan for the Airport Security Technology Integration SQT will be published separately [4, 5].

1.3 Scope

This Test and Evaluation Plan (TEP) addresses the verification of the ARGUS Program requirements that relate to human factors. Verification of the HF requirements will involve visual inspection, informal testing, and formal testing conducted at a designated airport or other FAA-approved location (to be determined). This TEP follows the FAA standard for test and evaluation [6] and includes information about the Critical Operational Issues and Criteria (COIC) and their associated Measures of Performance (MOPs), anticipated resources (materials and personnel) required for testing, anticipated schedule, and test procedures. Any ARGUS system that passes EDS Certification, whether it is a system developed by a Grantee or one provided by another Offeror, will be subjected to this verification testing.

This TEP assumes that ARGUS is an imaging system based on X-ray and computed tomography technology. If a Grantee or other Offeror presents an alternative, non-imaging technology as an ARGUS system and that system meets the criteria for FAA certification [1], then the requirements in this TEP that are unique to imaging systems will be waived during testing. Supplemental testing requirements may be necessary for any non-imaging technologies.

2. CRITICAL OPERATIONAL ISSUES AND CRITERIA

This section outlines the COIC and their associated MOPs that will be verified during the ARGUS HF SQT. The COIC focus on machine operability, state controls and displays, alarm resolution controls and displays, documentation, bag control, and training. The requirement numbers referenced in this section and in the requirements verification matrix of appendix A correspond to the nomenclature used in the ARGUS Test and Evaluation Master Plan (TEMP) [7].

At the conclusion of the HF SQT, each ARGUS system will receive one of three possible ratings for their ability to meet each MOP, and ultimately, each TEMP requirement. The possible ratings are Green (Meets FAA Requirement), Red (Does Not Meet Requirement), and White (Insufficient Data). These ratings will be reported to the ARGUS SQT Configuration Control Board (CCB), which will make the final decision about system success or failure.

2.1 Issue 1 – Operability: Operator Skill Level

TEMP Requirement 4: Is the ARGUS system operable by screeners who meet the requirements specified in the FAR §108.31, with regard to auditory and visual acuity, dexterity, English proficiency, and educational level?

Criterion 1-1. Successful completion of training and the Operator Qualification Test (OQT) by at least 5 out of 10 certified security screeners who work at an airport (to be determined) and meet the requirements specified in the FAR §108.31 at the time of testing. For the purposes of this test, none of the trainees who participate in training or the OQT for one ARGUS system may

participate in training or the OQT for any other ARGUS system, FAA-certified EDS, or a system that utilizes similar technology as the ARGUS system (e.g., Advanced Technology systems). Also, in accordance with the EDS Amendment, all of the participants must be a certified aviation security company employee and have at least one month of X-ray machine experience. Verification will occur through formal testing of operators.

MOP 1-1-1. At least 70% of the trainees receive a score of 80% or higher on the final written exam. The Grantee or Offeror will create the written exam as part of the training materials.

MOP 1-1-2. At least 70% of the trainees receive a Probability of Detection (Pd) of 0.60 or higher and a Probability of a False Alarm (Pfa) of 0.40 or below on the On-the-Job Training (OJT) final exam. The Grantee or Offeror will create the images for OJT as part of the training materials (see section 2.6). The FAA will create the bags for the OJT final exam.

MOP 1-1-3. At least 50% of the original trainees receive a Probability of Detection (Pd) and a Probability of a False Alarm (Pfa) on the OQT that meet the screener qualification standard [8].

2.2 Issue 2 – State Controls and Displays

2.2.1 System Status Displays

TEMP Requirement 5: Does the ARGUS system provide actionable displays on system status, calibration and automated diagnostic results, bag jam, and bad or incomplete scan events?

Criterion 2-1. Displays and/or messages on system status, calibration and automated diagnostic results, bag jam, and bad or incomplete scan events are provided by the system for every occurrence. Each display and/or message provides information and/or instructions that are understood by all operators. Verification will occur through visual inspection by an HFE and during informal testing of operators.

MOP 2-1-1. System displays to the operator the system status, results of calibration and automated diagnostics (also accessible via menu), bag jam messages, and bad or incomplete scan messages for 100% of occurrences.

MOP 2-1-2. System informs the operator for 100% of occurrences when operator intervention or action is required to resolve a machine fault or invalid command.

MOP 2-1-3. When a message indicates that operator intervention is required, the system does not allow the operator to continue until that requirement is met.

MOP 2-1-4. Information presented in status displays describes the situation accurately.

MOP 2-1-5. Information presented in status displays is consistent for repeated occurrences of the same event.

MOP 2-1-6. Operators are capable of understanding the information in a display and determining if any action is required of them.

MOP 2-1-7. Pop-up messages appear in the same location.

2.2.2 Start up and Power-down

TEMP Requirement 6: Does the ARGUS system permit simple start-up and power-down at one workstation?

Criterion 2-2. All operators can successfully start-up and power-down the ARGUS machine while stationed at the operator workstation. Verification will occur through visual inspection during machine operation by an HFE and informal testing of operators.

MOP 2-2-1. System controls for start-up and power-down are located at one workstation, which contains the operator console and interface.

MOP 2-2-2. Machine start-up (cold and stand-by) ends with the automatic opening of a login window.

MOP 2-2-3. Cold start-up procedures take an average of 15 minutes or less to complete. This assumes that the system has been turned off/shut down but is still plugged into a power source. Elapsed time is measured from the time that operator initiates the start-up procedure until the login screen appears.

MOP 2-2-4. Warm/Standby start-up procedures take three minutes or less to complete. This assumes that the system is still turned on but is in a sleep or stand-by state. Elapsed time is measured from the time that operator initiates the start-up procedure until the login screen appears.

MOP 2-2-5. Login process requires no more than 30 seconds from the time the operator enters user information and password to the time the operator is able to scan bags.

MOP 2-2-6. All operators are able to start-up the system without error. Start-up includes all procedures that are necessary before the operator may begin scanning baggage, including logging into the system.

MOP 2-2-7. Power-down procedures take two minutes or less to complete. This assumes that the operator is logged into the system in its operational mode.

MOP 2-2-8. All operators are able to power-down the system without error. Power-down includes all procedures that are necessary to turn the system completely off from its operational mode, including logging out of the system.

2.2.3 Image Quality

TEMP Requirement 7: Does the ARGUS system satisfy FAR Part 108.17(a)(5) and permit a typical operator to distinguish 24-gauge wire under the fifth step using a Test Step Wedge specified in the American Society for Testing and Materials (ASTM) Standard F792-82?

Criterion 2-3. All typical operators are able to distinguish 24-gauge wire under the fifth step using the ASTM Test Step Wedge on X-ray images. Verification will occur through visual inspection by an HFE and informal testing of operators.

MOP 2-3-1. A 24-gauge wire under the fifth step of an ASTM Test Step Wedge is distinguishable on X-ray images on 5 out of 5 trials. This test does not apply for CT images.

MOP 2-3-2. Image quality is not degraded when any system function is used to manipulate the displayed image. A 24-gauge wire under the fifth step of an ASTM Test Step Wedge is distinguishable on X-ray images, regardless of how the X-ray image is manipulated with each image function (machine dependent). This test does not apply for CT images or functions.

2.2.4 Human-Machine Interface

TEMP Requirement 8: Does the ARGUS system permit operation with a graphic user interface emphasizing "hard" keys or physical, dedicated switches for critical tasks involving state and alarm resolution functions?

Criterion 2-4. User interface and console provide unique, dedicated functions (in the form of keys, buttons, switches, and/or icons) for each task involving state or alarm resolution. Functions and messages shall be obvious to operators, easy to locate, and easy to understand. The user interface shall be based on standard human factors design principles [9]. Verification will occur through visual inspection by an HFE and informal testing of operators.

MOP 2-4-1. It takes the system 1 second or less from the time that a key or icon is selected to the time that the operator receives feedback that it was successfully selected (e.g., button illuminates, icon is highlighted, or icon/text appears to indicate the machine is processing request).

MOP 2-4-2. It takes the system no more than 2 seconds to complete any action(s) that follows the selection of a single alarm resolution function (i.e., console key, software icon, or software menu) by the operator, or to display to the operator a busy icon (e.g., an hourglass) or message (e.g., "Busy. Please wait.")

when it takes more than 2 seconds to complete any action(s) that follows the selection of a single alarm resolution function (i.e., console key, software icon, or software menu) by the operator.

MOP 2-4-3. Trained operators are able to correctly identify and distinguish between all labels, icons, and colors 100% of the time.

MOP 2-4-4. Icons, labels, and colors are used consistently across displays.

MOP 2-4-5. The system enables operators to activate and deactivate color-coding used on CT images.

MOP 2-4-6. Color-coding on CT images consist of red for potential explosives in the threat area, orange for potential explosives that are less than threshold quantities, yellow for shielded/opaque/non-penetrable objects, and blue/cyan for metallic objects. Operators are able to discriminate between red, orange, yellow, and blue/cyan 100% of the time.

MOP 2-4-7. Each machine-identified alarm object is surrounded by a color-coded outline/box on the X-ray image of the whole bag. A red box surrounds alarm objects. The outline/box for the current threat being processed by the operator is yellow.

MOP 2-4-8. If the ARGUS system requires that the operator make a separate decision for each alarm object (rather than for the bag only), the color-coded outline/box on the X-ray image of the whole bag updates to reflect the decision of the operator. The outline/box remains red when the operator identifies the alarm object as suspect. The outline/box is removed when the operator identifies the alarm object as clear.

MOP 2-4-9. Text messages are presented in mixed case format (i.e., as "Text" not as "TEXT" or "text"), with the exception of company logos.

MOP 2-4-10. The minimum character height of text is 2.3 mm (0.1 in).

MOP 2-4-11. If the same function keys or icons are available on more than one screen, then those functions appear in the same location across screens.

MOP 2-4-12. The system indicates to, and is understood by, operators 100% of the time when a function has been activated or deactivated on any screen or console.

MOP 2-4-13. Function keys and icons are assigned a single function, when possible. If a function key or icon must be used for more than one function, then the system distinguishes to the operator which function is currently available.

MOP 2-4-14. If an action requires the use of an embedded menu system or a multi-step process, then there is available, at all times, a menu selection, key, or icon that allows the operator to cancel the last action or return to the starting position.

MOP 2-4-15. The system has a physical, dedicated emergency-stop button present at the workstation.

MOP 2-4-16. The system has separate, dedicated keys or icons for the operator to make the final decision (i.e., clear or suspect/reject), and these keys or function icons are spaced at least one key- or icon-width apart from all other keys or function icons.

MOP 2-4-17. All screens/windows contain a title that conveys the purpose of that screen/window (e.g., "Log On Window" to indicate that the operator enters his or her log-in information in this window).

MOP 2-4-18. The system displays the mode of operation to operators 100% of the time. Mode of operation refers to any state of the machine that affects how the system operates, and it may apply to more than one function. For example, if different modes exist for scanning (e.g., hold-on-alarm vs. continuous) and/or displaying bags (e.g., alarm only vs. all bags), then the current modes selected for these functions shall be displayed to operators.

MOP 2-4-19. HFEs identify no major operational deficiencies with the necessary keys or icons. A major operational deficiency is defined as any event or function that impedes the operator's ability to carry out the necessary alarm resolution protocol, to track baggage that the operator identifies as requiring search, and/or to achieve the desired effective throughput.

MOP 2-4-20. Operators identify no major operational deficiencies with the necessary keys or icons.

2.3 Issue 3 – Alarm Resolution Controls and Displays

2.3.1 Effective Throughput

TEMP Requirement 9: Is the ARGUS system designed to permit an operator/test pilot to resolve alarms accurately and to achieve an average effective throughput of at least 50 bags per hour (irrespective of hand search)?

Criterion 3-1. The average effective throughput across all operators in this test is 50 bags per hour, not including hand search, while maintaining a specified level of alarm resolution performance [8] and using the required alarm resolution protocol. This evaluation will be repeated with one "test-pilot" chosen and provided by the ARGUS grantee [2].

All operators have successfully completed classroom training, OJT, and the OQT for the ARGUS system being tested, as specified in section 2.1, TEMP Requirement 4. In the MOPs described below, machine bag processing time begins when the leading edge of the bag breaks the electronic eye of the entrance to the time the image is displayed to the operator. Operator resolution time begins when the image is available for manipulation by the operator to the time the operator has completed pressing the necessary button or icon to indicate a final decision. Verification will occur through formal testing.

MOP 3-1-1. The mean resolution time (sec) for clear bags (RT_{CL}). This is composed of mean bag processing time of the machine (RT_{M_CL}) + mean resolution time of the operator (RT_{OP_CL}).

MOP 3-1-2. The mean resolution time (sec) for false alarm bags (RT_{FA}). This is composed of mean bag processing time of the machine (RT_{M_FA}) + mean resolution time of the operator (RT_{OP_FA}).

MOP 3-1-3. The mean resolution time (sec) for IED bags (RT_{IED}). This is composed of mean bag processing time of the machine (RT_{M_IED}) + mean resolution time of the operator (RT_{OP_IED}).

MOP 3-1-4. The machine false alarm rate (FAR_M) determined during FAA certification testing [1].

MOP 3-1-5. The mean effective throughput across all operators is greater than or equal to 50 bags/hour, not including hand search. Effective throughput (bags/hour) will be determined using the following equation (note that RT_{IED} is a null parameter):

$$\frac{3600 \text{ sec/hr}}{[RT_{CL}(1\text{-}FAR_M) + RT_{FA}(FAR_M) + RT_{IED}(0)] \text{ sec/bag.}}$$

Note: this equation is only appropriate for a hold-on-alarm system, in which the bag is held inside of the machine after being scanned. The FAA may modify this equation for continuously scanning systems that use an image queue once a trial run of the operational procedures is performed.

MOP 3-1-6. The mean effective throughput for the grantee-provided test pilot is greater than or equal to 50 bags/hour, not including hand search. Effective throughput (bags/hour) will be determined using the following equation (note that RT_{IED} is a null parameter):

$$\frac{3600 \text{ sec/hr}}{[RT_{CL}(1\text{-}FAR_M) + RT_{FA}(FAR_M) + RT_{IED}(0)] \text{ sec/bag.}}$$

MOP 3-1-6. The mean Pd across all operators for IED bags meets or exceeds the specified operator performance criteria [8].

MOP 3-1-7. The mean Pfa across all operators for false alarm bags meets or exceeds the specified operator performance criteria.

MOP 3-1-8. The mean d′ across all operators meets or exceeds the specified operator performance criteria.

MOP 3-1-9. The mean Pd for the grantee-provided test pilot for IED bags meets or exceeds the specified operator performance criteria [8].

MOP 3-1-10. The mean Pfa for the grantee-provided test pilot for false alarm bags meets or exceeds the specified operator performance criteria.

MOP 3-1-11. The mean d′ for the grantee-provided test pilot meets or exceeds the specified operator performance criteria.

2.3.2 Alarm Resolution Prompts

TEMP Requirement 10: Does the ARGUS system include a provision for alarm resolution prompts to reinforce basic operator alarm resolution steps?

Criterion 3-2. The ARGUS system shall include a provision for alarm resolution prompts to reinforce basic operator alarm resolution steps. Verification will occur through visual inspection by an HFE.

MOP 3-2-1. An operator-accessible menu presents to the operator, in order, prompts or reminders of the alarm resolution protocol steps.

MOP 3-2-2. The system does not automatically clear a bag image from the screen after an operator presses Suspect/Search. For hold-on-alarm systems, the current bag image remains on the screen until another bag is scanned. For continuously scanning systems, the current bag image remains on the screen until the operator responds appropriately to the prompt, "You have suspected this bag. Press the X button (to be defined by grantee) to erase the image and view the next bag."

MOP 3-2-3. Verifiable software "hooks" (capabilities) for displaying additional alarm resolution prompts exist. This capability shall be demonstrated to an HFE by the ARGUS grantee.

2.4 Issue 4 – Documentation

2.4.1 Operator's Manual

TEMP Requirement 11: Does the ARGUS system contain an operator's manual for all tasks to be performed by the screener including state management, alarm resolution, training, and limited diagnostics and maintenance information?

Criterion 4-1. ARGUS shall contain an operator's manual for all tasks to be performed by the screener including state management, alarm resolution, training and limited diagnostics, and maintenance. The operator's manual shall have a Flesch Reading Ease (FRE) score greater than or equal to 65. Verification will occur through visual inspection and calculation of the FRE by an HFE.

MOP 4-1-1. The operator's manual explains in sufficient detail all of the tasks required by operators for state management, logging on and off of the machine, alarm resolution, limited diagnostics, and limited maintenance. Detailed information for maintenance personnel shall not be contained within this document but within a separate document.

MOP 4-1-2. Terms and definitions described in the training materials are used consistently.

MOP 4-1-3. The operator's manual provides appropriate pictures, figures, and tables to supplement the text. All pictures, figures, and tables are labeled and are consistent with the explanations within the text.

MOP 4-1-4. The operator's manual text does not exceed an 8th grade reading level, which is equivalent to an FRE score greater than or equal to 65, as calculated by the FRE formula. See section 3.5.1 for more details.

2.4.2 Human Factors Issues Log

TEMP Requirement 12: Does the ARGUS system include a physical log or manual record that has been maintained throughout its design, fabrication, and testing?

Criterion 4-2. ARGUS shall include a physical log or manual record that identifies and tracks to resolution human factors issues including manpower, personnel, training, human factors engineering, and health and safety. Each ARGUS vendor is responsible for maintaining a human factors issues log throughout product development. Verification will occur through visual inspection by an HFE.

MOP 4-2-1. The human factors log documents, throughout the development cycle, issues related to manpower, personnel, training, human factors engineering, and health and safety. The log contains the date that an issue arose, the person assigned to investigate the issue, a description of the issue, the solution that was

achieved, and the date of the solution. The log may be kept in an electronic or paper format.

2.5 Issue 5 – Bag Control

TEMP Requirement 13: Does the ARGUS system permit direct personnel access to the main inspection enclosure to manually clear a bag jam in less than 60 seconds from time of discovery to resumption of inspection? (Note that the original ARGUS specification states a time of less than 30 seconds. This time has been increased to less than 60 seconds in the procurement spec, and therefore, this is the figure that will be used in the HF SQT.)

Criterion 5-1. ARGUS shall safely permit 100% of operators access to the main inspection enclosure to manually clear a bag jam in less than 60 seconds. When a bag jam occurs during training or the SQT, verification will occur through visual inspection of operators. If no bag jams occur, then the FAA Security Equipment Integrated Product Team (SEIPT) will verify this requirement during the Operational Utility Evaluation (OUE), at which time operators will screen stream of commerce bags.

MOP 5-1-1. Mean time for operators/bag handlers to clear a bag jam from the scanning chamber and resume bag inspection is less than 60 seconds.

TEMP Requirement 14: Does the ARGUS system permit all operators and bag handlers to identify and control 100% of the bags that are deemed suspicious?

Criterion 5-2. ARGUS shall permit all operators and bag handlers to identify and control 100% of the bags they deem suspicious. Verification will occur through informal testing by HFEs.

MOP 5-2-1. All operators/bag handlers correctly match a bag that has been identified on the screen as "suspect" with the real bag that has exited the scanning chamber.

2.6 Issue 6 – Training

TEMP Requirement 17: Does the ARGUS system have a training package to create qualified operators?

Criterion 6-1. ARGUS shall contain a training package, completed by the end of Phase III, to create qualified operators. Phase III ends after certification readiness, before the start of certification testing. Verification will occur through visual inspection by an HFE and formal testing of operators following training.

MOP 6-1-1. Training package is consistent with the SEIPT Uniform Training Requirements in appendix B. These requirements include modules for at least the Overview of Equipment Functions, Routine Use of Equipment, Alarm Processing, Standard Operating Procedures, Emergency and Safety Procedures, and On-the-

Job Training. Appendix B includes an example outline for modules and sub-modules that should be discussed.

MOP 6-1-2. Training package is delivered to the ARGUS Human Factors Test Lead or designated representative at least one week in advance of the machine delivery date for certification testing at the FAA William J. Hughes Technical Center.

MOP 6-1-3. Training package contains one review quiz at the end of each module as well as a comprehensive final exam for classroom training.

MOP 6-1-4. Terms and definitions described in the training materials are used consistently.

MOP 6-1-5. Training materials include appropriate pictures, figures, and tables to supplement the text.

MOP 6-1-6. Classroom training materials include examples of IEDs and explosive materials, as well as common objects that falsely generate machine alarms, as they appear outside of the scanner and when scanned.

MOP 6-1-7. Training materials for OJT, which can consist of saved images on the machine or simulator or as live bags, include a minimum of 100 bag images. Two-thirds of these images are IED alarms and one-third of these images are false alarms.

MOP 6-1-8. OJT IED image set contains examples made using commercial, military, and sheet explosives.

MOP 6-1-9. OJT IED image set contains examples of bag as bomb, contained electronic/electrical, contained other, open, sympathetic, and shielded IEDs.

MOP 6-1-10. IEDs are composed of explosives that range in size, with a minimum size equal to 75% and a maximum size of 150% of the current EDS certification standard weight.

MOP 6-1-11. OJT is conducted in groups no larger than five trainees, during which time each trainee in the group receives multiple opportunities to resolve several bag images at a time on the machine or simulator. The instructor and group provide feedback to each trainee at this time.

MOP 6-1-12. Student training manual text does not exceed an 8th grade reading level, which is equivalent to a score greater than or equal to 65 as calculated by the FRE formula. See sections 3.5.1 for more detail.

MOP 6-1-13. At least 70% of the original trainees receive a score of 80% or higher on the final written exam for classroom training. The Grantee or Offeror will create the written exam as part of the training materials (same as MOP 1-1-1).

MOP 6-1-14. At least 70% of the trainees receive a Probability of Detection (Pd) of 0.60 or higher and a Probability of a False Alarm (Pfa) of 0.40 or below on the OJT final exam. The Grantee or Offeror will create the images for OJT as part of the training materials (see section 2.6). The FAA will create the bags for the OJT final exam (same as MOP 1-1-2).

MOP 6-1-15. At least 50% of the original trainees receive a passing score on the final written exam and on the OQT. The screener qualification standards are contained within a separate document [8] (same as MOP 1-1-3).

3. METHOD

The HF SQT will include three types of verification testing: visual inspection, informal testing, and formal testing. These methods may be used in isolation or in conjunction with another method to complete the qualification testing. Two phases have been defined. Phase 1 includes the training evaluation and Phase 2 includes the formal testing. Appendix A outlines each TEMP requirement being tested, the corresponding MOPs, and the method of verification testing that will be used. One HF test group will be used to test ARGUS systems provided by the Grantees or other Offerors, and this test group will use the same test methodology and data collection forms for all systems. Systems provided by the Grantees will be tested before systems provided by other Offerors in the event of a conflict. Otherwise, systems will be tested in the order in which they achieve FAA certification and demonstrate readiness to begin the HF SQT. Only the ARGUS Test Director or the Human Factors Segment Lead may make an exception to this rule. The details of the HF SQT are discussed in the sections 3.1 through 3.5.

3.1 Test Site

The test site(s) for the HF SQT will be at or near a large U.S. airport(s) or at another FAA-approved site (to be determined). The test site(s) will have a training classroom and a separate area for the installation of the machine. Temporary walls or baffles will surround the installed machine(s) during the testing phase to separate the operators from distractions. The operator training phase for one ARGUS system may overlap with the operator-testing phase of another system. If this is necessary, then the second system will be installed in a different location than the first system. For consistency across the screening population, all ARGUS systems will be installed and tested at one airport location, at two airport locations in close proximity (e.g., John F. Kennedy and LaGuardia airports), or at another FAA-approved site. It is intended that the test site(s) for the HF SQT will be coincident with the OUE test site(s) chosen by the SEIPT to reduce the cost and delay of moving the EDS to another site.

3.2 Test Participants

Test participants for the HF SQT will consist of 10 certified security screeners, or other FAA-approved group, per ARGUS system. The participants for each ARGUS system will be selected from the airport test site, must be at least 18 years of age, and must not be pregnant. None will have completed training for or have operate more than one ARGUS system, FAA-certified EDS, or a system that utilizes similar technology as the ARGUS system (e.g., Advanced Technology systems). All potential trainees must meet the requirements established by FAR §108.31, have at least one month X-ray image experience, pass the Ishihara test for color blindness, and pass a vision test showing at least 20/30 vision (with or without the aid of glasses or contacts).
The Human Factors Segment Lead or designated representative will obtain a list of potential trainees from the security company manager. The Human Factors Segment Lead/designated representative will write each name on a piece of paper and will randomly choose 10 of the pieces of paper from an envelope per vendor. The screeners identified on these 10 pieces of paper will serve as the ARGUS trainees for the system being tested. Because the security manager is responsible for maintaining an adequate level of security at his/her checkpoints, he/she has the ultimate authority to deny or grant permission for an X-ray screener to participate in the training class and follow-up testing. All participants will be monetarily compensated using ARGUS Research and Development funds, at a wage that is negotiated with the screening company. To encourage the security company to provide motivated screeners, the security company will receive a pre-determined cash bonus for each screener who completes all of the testing requirements for the HF SQT. In addition, each screener who receives a passing score on the OQT and completes the remaining HF SQT requirements (i.e., throughput and performance testing) will receive a pre-determined cash bonus.

3.3 Test Personnel

This section describes the test personnel that will be supplied by the ARGUS Research and Development Program to complete the HF SQT. To maintain consistency across ARGUS systems, only one team will conduct the HF SQT evaluations for all ARGUS systems, regardless of whether a Grantee or another Offeror provides the system for testing. The exception to this rule is the Training Instructor, which is an individual provided by each Grantee or Offeror.

a. Baggage Handlers. Two baggage handlers will be required for each ARGUS system, one for loading bags onto and one for unloading bags from the conveyer belts. They will be responsible for handling all test bags during formal testing. Two baggage handlers will be chosen from a pool of four possible trained baggage handlers. There will be a pool of four so that no baggage handler must be on travel for more than two consecutive weeks.

b. Baggage Manager. One baggage manager will ensure that the test bags are in the correct order as they enter the machine during formal testing. The baggage manager will also monitor and track any bags that result in a bad scan and require rescanning.

c. Computer Systems Specialist. One computer systems specialist will create, populate, and manage a database for each ARGUS system that will be used to track the status of

the HF SQT requirements and to enter operators' responses to the test bags. This person will also populate the database with the participants' responses. This person does not need to be present during the SQT data collection.

d. Human Factors Engineers. Four HFEs will be required to complete the training evaluation, which includes the informal testing and visual inspection of system functions and documentation, and the formal testing. Two HFEs will observe the training course, which the Grantee or Offeror will teach; and they will record information about the course content, instructor-student interaction, student performance on in-class exercises and exams, as well as operator performance on the MOPs that are verified during training. They will also record any problems or deficiencies that are encountered with the ARGUS system during training.

During formal testing, two HFEs will sit near the operators and record their responses for each FAA test bag. They will also record any problems or deficiencies that are encountered with the ARGUS system during testing. For consistency across evaluation phases, one of the HFEs who conducts the training evaluation will also collect data during formal testing. Table 1 illustrates how this exchange will occur.

TABLE 1. HFE PERSONNEL FLOW FOR HF SQT PHASES 1 AND 2

ARGUS Grantee	Phase 1 Team	Phase 2 Team
1	HFE 1 & HFE 3	HFE 2 & HFE 3
2	HFE 1 & HFE 4	HFE 2 & HFE 4
3	HFE 1 & HFE 3	HFE 2 & HFE 3

e. OQT Test Personnel. SEIPT contract support will administer the OQT to trainees after they pass the classroom exams.

f. Test Controller. One test controller, which is the Human Factors Segment lead or designated representative, will organize the test personnel, brief the participants on the experimental procedures, and supervise the testing.

g. Training Instructors. One instructor will train the test participants with the training course for that system, as well as administer the final classroom and OJT tests. Each ARGUS Grantee or other Offeror will provide a training instructor.

3.4 Test Materials

In addition to the requirements verification matrix in appendix A, informed consent forms and several data collection forms will be used (see appendix C) in the conduct of the ARGUS HF SQT. All forms will be standardized across ARGUS systems. During the HF SQT, data collectors and HFEs will also require the use of stopwatches and laptop computers for collecting and recording data.

3.4.1 Informed Consent Form

Before operators participate in the HF SQT, they will complete an Informed Consent Form (ICF). This form will explain the purpose of the HF SQT and will inform them of their rights as voluntary participants. Operators will be permitted to complete the testing if they agree with the terms of participation outlined by the ICF (see appendix C).

3.4.2 Forms for Informal Testing and Visual Inspection (Phase 1)

HFEs will use the requirements verification matrix in appendix A to guide their data collection during informal testing and visual inspection of each ARGUS system. For each requirement listed, they will record whether the system receives a Green, Red, or White rating, as well as any observations or special notes for any requirement. HFEs will also record any design or operational deficiencies they observe with any controls and displays.

3.4.3 Forms for Formal Testing (Phase 2)

Data collectors will use forms in the conduct of the formal testing. They will use these forms to record the machine functions used by screeners, the operators' decisions for each alarm object and bag, the errors made in the use of the protocol, the time to resolve each alarm bag, the time to clear jammed bags, and any operational deficiencies that are observed during the OQT and the HF SQT for alarm resolution performance. The data collection form for formal testing is in appendix C, with the exception of the alarm resolution form. The data collection forms for the alarm resolution protocol for each ARGUS system will be created when the Grantees or other Offerors release their alarm resolution protocols for ARGUS to the Human Factors Lead or designated representative.

3.4.4 Test Bags for Formal Testing (Phase 2)

The bag set that will be used to conduct the OQT will consist of a validated bag set created by the SEIPT. This bag set includes bags containing IEDs and false alarm objects. Each participant will be shown the complete bag set.

The bag set for the HF SQT, accuracy and effective throughput test, will consist of 75 validated test bags created by the FAA Aviation Security Human Factors Program. This bag set will contain 25 threats, 25 non-threat false alarms, and 25 clear bags. The threat bags will consist of bag as bomb, contained electronic, contained other, open, sympathetic, and shielded IEDs. The IEDs will be composed of a variety of validated explosives simulants that range in weight from 75% to 125% of the current FAA certification standard. The false alarm bags will consist of non-threat objects that are known to cause alarms on the ARGUS system being tested. Each Grantee or other Offeror will provide a list of non-threat items that cause that ARGUS system to alarm during airport and factory data collection to assist in the development of these bags. All test bags will be validated on each ARGUS system prior to the HF SQT. Any item that does not generate an alarm on a particular system during the bag validation process will be substituted with another simulant material or false alarm object that closely approximates the intention of the original design. These bags will be shipped to the HF SQT test site. The performance

requirements for operators during the OQT and the HF SQT are specified in a separate document [8].

3.4.5 Questionnaires

Questionnaires will be used to solicit input from the test participants regarding the ARGUS systems. All participants will complete a questionnaire about the training in addition to a questionnaire about the ARGUS system functions and displays after they complete the formal testing. The HFEs who observe training will also be asked to complete a questionnaire about the training course. Appendix C contains these questionnaires.

3.5 Test Procedures

The following sections describe the procedures that will be used to complete the HF SQT for each ARGUS system. Activities include documentation evaluation, operator training evaluation, informal testing and visual inspection, and formal testing.

Table 1 in section 3.3 outlined how the HFE test personnel flow will be allocated for the training evaluation/informal testing (Phase 1) and the formalized testing (Phase 2). Note that HFE 1 will participate in all Phase 1 evaluations and HFE 2 will participate in all Phase 2 evaluations. Because only one test team will be used to evaluate all ARGUS systems, as soon as the training team has completed their evaluation for one Grantee or Offeror, they may advance to the test site for the next Grantee or Offeror. Table 2 outlines the proposed testing schedule for the ARGUS systems, with the assumption that the ARGUS systems are shipped to the William J. Hughes Technical Center for machine certification one immediately after another.

TABLE 2. PROPOSED TEST SCHEDULE FOR ARGUS SYSTEMS

WEEK											
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
ARGUS-1 Arrives		ARGUS-1 Cert ARGUS-2 Arrives		ARGUS-2 Cert ARGUS-3 Arrives		ARGUS-3 Cert					
		Validate HF Bags ARGUS-1		Validate HF Bags ARGUS-2		Validate HF Bags ARGUS-3					
				Phase 1 ARGUS-1 HFE 1 & HFE 3		Phase 2 ARGUS-1 HFE 2 & HFE 3					
				Ship HF Bags to Test Site A							
						Phase 1 ARGUS-2 HFE 1 & HFE 4		Phase 2 ARGUS-2 HFE 2 & HFE 4			
						Ship HF Bags to Test Site B					
								Phase 1 ARGUS-3 HFE 1 & HFE 3		Phase 2 ARGUS-3 HFE 2 & HFE 3	
								Ship HF Bags to Test Site C			

3.5.1 Documentation Evaluation

HFEs will review and evaluate all documentation for the ARGUS systems, including operator's manuals and training course materials. HFEs will determine if the materials meet the requirements as specified in the MOPs of sections 2.4.1 and 2.6 (Requirements 11 and 17).

HFEs will also calculate the FRE for both the operator's manual and the training manual. Where possible, the FRE will be calculated using a software program that analyzes the text. The following steps are used to calculate the FRE (formula obtained from the website, http://www.csun.edu/~vcecn006/read1.htm#Flesch):

1. Determine length of text sample;
2. Determine number of sentences in sample;
3. Determine average sentence length (words per sentence) in sample;
4. Determine number of syllables in sample;
5. (Average sentence length)*(1.015);
6. (Number of syllables)*(0.846);
7. Add the results of steps 5 and 6;
8. Subtract the results of step 7 from 206.835;
9. Score between 61 and 65 = 8^{th} grade level;
10. Score greater than 61 = below 8^{th} grade level.

3.5.2 Operator Training Evaluation

Each ARGUS Grantee or other Offeror will provide an instructor to train 10 certified X-ray screeners on the operation of that ARGUS system. Training for a given system is expected to require 2 weeks or 80 hours, with one week (40 hours) of classroom lecture and one week (40 hours) of OJT using the machine or simulator. At the conclusion of classroom training, trainees will be required to take a written final exam, on which they must obtain a score of 80% to pass. At the conclusion of OJT, trainees must take an OJT image test on the machine or simulator, on which they must obtain a minimum Pd = 0.60 and a maximum Pfa = 0.40. All screeners who participate in the training will be asked to complete a questionnaire about the quality of the course materials and instructor after they complete the training. Two HFEs will attend and evaluate the training course conducted by each ARGUS grantee according to the MOPs specified in section 2.6 for Requirements 17. HFEs will also record any recommendations for change.

3.5.3 Informal Testing and Visual Inspection

HFEs will conduct visual inspection and informal testing with participants, for some of the MOPs specified in section 2, to verify that each ARGUS system meets the requirements of the grant. The requirements for which informal testing and/or visual inspection will be used include: the system status displays (Requirement 5), the start-up and power-down procedures (Requirement 6), image quality (Requirement 7), human-machine interface (Requirement 8), alarm resolution prompts (Requirement 10), operator's manual (Requirement 11), human factors log (Requirement 12), bag control (Requirements 13 and 14), and training (Requirement 17).

HFEs will use the requirements verification matrix in appendix A to guide the visual inspection and informal testing with the trainees. HFEs will record the participants' feedback and any system deficiencies that are found during testing. This testing will be conducted during the OJT session of the training course.

3.5.4 Formal Testing

Following their completion of the ARGUS system training, trainees will participate in formal testing. Each ARGUS system will be tested individually, and only one trainee may participate at a time. A temporary wall will be placed between the operator and the machine to prevent the operator from viewing the test bags. The first formal test will consist of the OQT (Requirement 4) administered by SEIPT test personnel. The test procedures will follow those that SEIPT uses to test the trainees of current EDS devices. The OQT is not a timed test, and therefore, it could require as little as one hour or as much as 8 hours for each trainee to complete. Therefore, at least five days are scheduled for this effort. Each trainee only receives one chance to pass the OQT.

The second formal test will involve only those trainees who passed the OQT. This test will verify that operators are able to achieve an effective throughput of 50 bags/hour while maintaining the desired performance [8] (Requirement 9). The FAA test bags described in 3.4.4 will be used for this testing. All participants will be given time to re-familiarize themselves with the system before testing begins. For consistency, at least one of the HFEs who evaluated the training course must be present for the formal test using FAA test bags. The Test Controller will instruct the participants to use the alarm resolution protocol they learned in class to resolve each machine alarm and that this should be done as quickly as possible while maintaining accuracy. The HFE data collectors will record the functions that participants use, time to clear any jammed bags (Requirement 13), time to resolve each bag, and the participants' decisions for each alarm object and the whole bag. HFEs will also record any deficiencies with the design or operation of the ARGUS system that impedes operator performance. Participants will be asked to complete a questionnaire about the ARGUS system after they complete the testing.

4. DATA ANALYSIS AND REPORTING

Following the HF SQT for each ARGUS system, HFEs will compile the data and submit a report to the ARGUS SQT CCB. Each report will indicate the Green, Red, or White rating for each MOP in the requirements verification matrix, explain any deficiencies with the design or operation of system controls or displays that were noted during testing, and specify recommendations for change. The CCB will evaluate the ratings for each MOP relative to a predetermined prioritization scale for the MOPs. Only the CCB may decide whether a system passes or fails the SQT. The CCB will provide the final decision to the SEIPT to inform the SEIPT's decision to proceed with operational testing.

5. REFERENCES

1. Koo, L., Revised FAA Management Plan for Explosives Detection System Certification Testing (DOT/FAA/AR-01/19). FAA William J. Hughes Technical Center, Atlantic City, NJ, 2001.

2. ARGUS Explosive Detection System (EDS), Solicitation No. 99.1, with Rev 8.8 of Appendix A, "Revised ARGUS Explosives Detection System," 2000.

3. FAA Order 1810.1F, Acquisition Policy, Department of Transportation. National Technical Information Service, Springfield, Virginia, 1993.

4. Fabry, D. J., & Aishton, T. H., ARGUS EDS System Qualification Test Plan (DOT/FAA/AR-01/TBD). FAA William J. Hughes Technical Center, Atlantic City, NJ, 2001.

5. Wilson, D., Airport Security Technology Integration (ASTI) System Qualification Test Plan for ARGUS EDS (DOT/FAA/AR-01/TBD). FAA William J. Hughes Technical Center, Atlantic City, NJ, 2001.

6. FAA Standard for Test and Evaluation (FAA-STD-0246).

7. Fabry, D. J., & Aishton, T. H., ARGUS EDS Test and Evaluation Master Plan (DOT/FAA/AR-01/38). FAA William J. Hughes Technical Center, Atlantic City, NJ, 2001.

8. Dixon, M. W., ARGUS Operator Performance Criteria. FAA William J. Hughes Technical Center, Atlantic City, NJ, 2001.

9. Ahlstrom, V., & Longo, K., Human Factors Design Guide Update (Report Number DOT/FAA/CT-96/01): A Revision to Chapter 8-Computer Human Interface Guidelines (DOT/FAA/CT-01/08). FAA William J. Hughes Technical Center, Atlantic City, NJ, 2001.

APPENDIX A
HUMAN FACTORS REQUIREMENTS VERIFICATION MATRIX[1]

1 Text in the ARGUS TEMP [7] takes precedence for the description of the requirements. This copy is included for reference only and for description of MOPs.

TABLE 3. HUMAN FACTORS REQUIREMENTS VERIFICATION MATRIX

Legend	
F	Formal Testing
I	Informal Testing
V	Visual Inspection

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
4	ARGUS shall be operable by screeners whose personnel requirements are specified in FAR Part 108.31 in terms of auditory and visual acuity, dexterity, English proficiency, and educational level. MOP 1-1-1. At least 70% of the trainees receive a score of 80% or higher on the final written exam. The Grantee or Offeror will create the written exam as part of the training materials. MOP 1-1-2. At least 70% of the trainees receive a Probability of Detection (Pd) of 0.60 or higher and a Probability of a False Alarm (Pfa) of 0.40 or below on the On-the-Job Training (OJT) final exam. The Grantee or Offeror will create the images for OJT as part of the training materials (see section 2.6). The FAA will create the bags for the OJT final exam. MOP 1-1-3. At least 50% of the original trainees receive a Probability of Detection (Pd) and a Probability of a False Alarm (Pfa) on the OQT that meet the screener qualification standard [8].	F		

Record: 1007666

BATCH-ID	FULL0126B
DataType	Full Process
Agncy Type	FULL
01-Accession No	PB2001-108599
Abbrev. Accn.No.	PB2001108599
Doc-Type	RPT
Stock	00000
Bin#	0000
Stk-Type	N
03-Src.Agency	DOTFAA
03-Annc.GRA	Y
03-Annc.Alert	Y
08-GRA/I Jrnl	u
08-GRA/I VVII	0126
Weekly VVII	0126B
Releasiblity	C
Pg.Cnt	00048
04-Media-1	PC
04-PC Price Cd	A04
PC Action Cd	PO
04-PC Avail-NTIS	Y
FP1	1
FP2	2
FP3	1
FP4	1
FP5	1
04-MF Media	MF
04-MF Price Cd	A01
MF Action Cd	MA
04-MF Avail.NTIS	Y
21-Suppl. Notes	Prepared in cooperation with Battelle Memorial Inst., Columbus, OH. Sponsored by Federal Aviation Administration, Washington, DC. Office of Aviation Research.
22-Availability	Product reproduced from digital image.
03-Cover-Flg	Y
03-Print HDR	Y
03-SRIM Flg	Y
Process Acct.Cd	501
Prod. Mgr.Cd	H
Receipt Type	1
Prod.Code	13300
Inven.Trans.Cd	X
35-NTIS Cd	115381000
05-Prime Author	William J. Hughes Technical Center, Atlantic City, NJ.
05-Secon.Author:	Battelle Memorial Inst., Columbus, OH.
05-Sponsors	Federal Aviation Administration, Washington, DC. Office of Aviation Research.
06-Title	ARGUS EDS System Qualification Test Plan.
10-Authors	D. J. |2 Fabry
10-Authors	T. H. |2 Aishton
11-Rpt.Mon	Sep
11-Rpt.Yr	2001
14-Report Nos	DOT/FAA/AR-01/92
Date Rec.Creatd	SKRAUS |D 2001 09 17 |T 11:24:21
Accng.Updated	JTAYLO |D 2001 10 02 |T 14:03:50
Accng.Completed	09/27/2001
Accng.to IBM	10/03/2001

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
5	ARGUS shall provide informative and actionable displays on system status, calibration and automated diagnostic results, bag jam and bad or incomplete scan events. MOP 2-1-1. System displays to the operator the system status, results of calibration and automated diagnostics (also accessible via menu), bag jam messages, and bad or incomplete scan messages for 100% of occurrences. MOP 2-1-2. System informs the operator for 100% of occurrences when operator intervention or action is required to resolve a machine fault or invalid command. MOP 2-1-3. When a message indicates that operator intervention is required, the system does not allow the operator to continue until that requirement is met. MOP 2-1-4. Information presented in status displays describes the situation accurately. MOP 2-1-5. Information presented in status displays is consistent for repeated occurrences of the same event. MOP 2-1-6. Operators are capable of understanding the information in a display and determining if any action is required of them. MOP 2-1-7. Pop-up messages appear in the same location.	I, V		

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
6	ARGUS shall permit simple start-up and power-down at one workstation. MOP 2-2-1. System controls for start-up and power-down are located at one workstation, which contains the operator console and interface. MOP 2-2-2. Machine start-up (cold and stand-by) ends with the automatic opening of a login window. MOP 2-2-3. Cold start-up procedures take an average of 15 minutes or less to complete. This assumes that the system has been turned off/shut down but is still plugged into a power source. Elapsed time is measured from the time that operator initiates the start-up procedure until the login screen appears. MOP 2-2-4. Warm/Standby start-up procedures take three minutes or less to complete. This assumes that the system is still turned on but is in a sleep or stand-by state. Elapsed time is measured from the time that operator initiates the start-up procedure until the login screen appears. MOP 2-2-5. Login process requires no more than 30 seconds from the time the operator enters user information and password to the time the operator is able to scan bags. MOP 2-2-6. All operators are able to start-up the system without error. Start-up includes all procedures that are necessary before the operator may begin scanning baggage, including logging into the system.	I, V		

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
6	MOP 2-2-7. Power-down procedures take two minutes or less to complete. This assumes that the operator is logged into the system in its operational mode. MOP 2-2-8. All operators are able to power-down the system without error. Power-down includes all procedures that are necessary to turn the system completely off from its operational mode, including logging out of the system.			
7	ARGUS shall satisfy FAR Part 108.17 (a)(5) and shall permit a typical operator to distinguish 24-gauge wire under the fifth step using a Test Step Wedge specified in American Society for Testing and Materials (ASTM) Standard F792-82. MOP 2-3-1. A 24-gauge wire under the fifth step of an ASTM Test Step Wedge is distinguishable on X-ray images on 5 out of 5 trials. This test does not apply for CT images. MOP 2-3-2. Image quality is not degraded when any system function is used to manipulate the displayed image. A 24-gauge wire under the fifth step of an ASTM Test Step Wedge is distinguishable on X-ray images, regardless of how the X-ray image is manipulated with each image function (machine dependent). This test does not apply for CT images or functions.	I, V		
8	ARGUS shall permit operation with a graphic user interface emphasizing 'hard' keys or physical, dedicated switches for critical tasks involving state and alarm resolution functions.	I, V		

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
	MOP 2-4-1. It takes the system 1 second or less from the time that a key or icon is selected to the time that the operator receives feedback that it was successfully selected (e.g., button illuminates, icon is highlighted, or icon/text appears to indicate the machine is processing request). MOP 2-4-2. It takes the system no more than 2 seconds to complete any action(s) that follows the selection of a single alarm resolution function (i.e., console key, software icon, or software menu) by the operator, or to display to the operator a busy icon (e.g., an hourglass) or message (e.g., "Busy. Please wait.") when it takes more than 2 seconds to complete any action(s) that follows the selection of a single alarm resolution function (i.e., console key, software icon, or software menu) by the operator. MOP 2-4-3. Trained operators are able to correctly identify and distinguish between all labels, icons, and colors 100% of the time. MOP 2-4-4. Icons, labels, and colors are used consistently across displays. MOP 2-4-5. The system enables operators to activate and deactivate color-coding used on CT images. MOP 2-4-6. Color-coding on CT images consist of red for potential explosives in the threat area, orange for potential explosives that are less than threshold quantities, yellow for shielded/opaque/non-penetrable objects, and blue/cyan for metallic objects. Operators are able to discriminate between red, orange, yellow, and blue/cyan 100% of the time.			

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
	MOP 2-4-7. Each machine-identified alarm object is surrounded by a color-coded outline/box on the X-ray image of the whole bag. A red box surrounds alarm objects. The outline/box for the current threat being processed by the operator is yellow. MOP 2-4-8. If the ARGUS system requires that the operator make a separate decision for each alarm object (rather than for the bag only), the color-coded outline/box on the X-ray image of the whole bag updates to reflect the decision of the operator. The outline/box remains red when the operator identifies the alarm object as suspect. The outline/box is removed when the operator identifies the alarm object as clear. MOP 2-4-9. Text messages are presented in mixed case format (i.e., as "Text" not as "TEXT" or "text"), with the exception of company logos. MOP 2-4-10. The minimum character height of text is 2.3 mm (0.1 in). MOP 2-4-11. If the same function keys or icons are available on more than one screen, then those functions appear in the same location across screens. MOP 2-4-12. The system indicates to, and is understood by, operators 100% of the time when a function has been activated or deactivated on any screen or console. MOP 2-4-13. Function keys and icons are assigned a single function, when possible. If a function key or icon must be used for more than one function, then the system distinguishes to the operator which function is currently available. MOP 2-4-14. If an action requires the use of an embedded menu system			

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
	or a multi-step process, then there is available, at all times, a menu selection, key, or icon that allows the operator to cancel the last action or return to the starting position. MOP 2-4-15. The system has a physical, dedicated emergency-stop button present at the workstation. MOP 2-4-16. The system has separate, dedicated keys or icons for the operator to make the final decision (i.e., clear or suspect/reject), and these keys or function icons are spaced at least one key- or icon-width apart from all other keys or function icons. MOP 2-4-17. All screens/windows contain a title that conveys the purpose of that screen/window (e.g., "Log On Window" to indicate that the operator enters his or her log-in information in this window). MOP 2-4-18. The system displays the mode of operation to operators 100% of the time. Mode of operation refers to any state of the machine that affects how the system operates, and it may apply to more than one function. MOP 2-4-19. HFEs identify no major operational deficiencies with the necessary keys or icons. MOP 2-4-20. Operators identify no major operational deficiencies with the necessary keys or icons.			
9	ARGUS shall be designed to permit an operator/test pilot to resolve alarms accurately and achieve an average effective throughput of at least 50 bags per hour (irrespective of hand search).	F		

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
	MOP 3-1-1. The mean resolution time (sec) for clear bags (RT_{CL}). This is composed of mean bag processing time of the machine (RT_{M_CL}) + mean resolution time of the operator (RT_{OP_CL}). MOP 3-1-2. The mean resolution time (sec) for false alarm bags (RT_{FA}). This is composed of mean bag processing time of the machine (RT_{M_FA}) + mean resolution time of the operator (RT_{OP_FA}). MOP 3-1-3. The mean resolution time (sec) for IED bags (RT_{IED}). This is composed of mean bag processing time of the machine (RT_{M_IED}) + mean resolution time of the operator (RT_{OP_IED}). MOP 3-1-4. The machine false alarm rate (FAR_M) determined during FAA certification testing [1]. MOP 3-1-5. The mean effective throughput across all operators is greater than or equal to 50 bags/hour, not including hand search. The FAA may modify this equation for continuously scanning systems that use an image queue once a trial run of the operational procedures is performed. MOP 3-1-6. The mean effective throughput for the grantee-provided test pilot is greater than or equal to 50 bags/hour, not including hand search. MOP 3-1-6. The mean Pd across all operators for IED bags meets or exceeds the specified operator performance criteria [8]. MOP 3-1-7. The mean Pfa across all operators for false alarm bags meets or exceeds the specified operator performance criteria.			

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
	MOP 3-1-8. The mean d′ across all operators meets or exceeds the specified operator performance criteria. MOP 3-1-9. The mean Pd for the grantee-provided test pilot for IED bags meets or exceeds the specified operator performance criteria [8]. MOP 3-1-10. The mean Pfa for the grantee-provided test pilot for false alarm bags meets or exceeds the specified operator performance criteria. MOP 3-1-11. The mean d′ for the grantee-provided test pilot meets or exceeds the specified operator performance criteria.			
10	ARGUS shall include a provision for alarm resolution prompts to reinforce basic operator alarm resolution steps. MOP 3-2-1. An operator-accessible menu presents to the operator, in order, prompts or reminders of the alarm resolution protocol steps. MOP 3-2-2. The system does not automatically clear a bag image from the screen after an operator presses Suspect/Search. For hold-on-alarm systems, the current bag image remains on the screen until another bag is scanned. For continuously scanning systems, the current bag image remains on the screen until the operator responds appropriately to the prompt, "You have suspected this bag. Press the X button (to be defined by grantee) to erase the image and view the next bag." MOP 3-2-3. Verifiable software "hooks" (capabilities) for displaying additional alarm resolution prompts exist. This capability shall be demonstrated to an HFE by the ARGUS grantee.	I, V		

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
11	ARGUS shall contain an operator's manual for all tasks to be performed by the screener including state management, alarm resolution, training and limited diagnostics and maintenance. MOP 4-1-1. The operator's manual explains in sufficient detail all of the tasks required by operators for state management, logging on and off of the machine, alarm resolution, limited diagnostics, and limited maintenance. Detailed information for maintenance personnel shall not be contained within this document but within a separate document. MOP 4-1-2. Terms and definitions described in the training materials are used consistently. MOP 4-1-3. The operator's manual provides appropriate pictures, figures, and tables to supplement the text. All pictures, figures, and tables are labeled and are consistent with the explanations within the text. MOP 4-1-4. The operator's manual text does not exceed an 8th grade reading level, which is equivalent to an FRE score greater than or equal to 65, as calculated by the FRE formula.	I, V		
12	Throughout its design, development, fabrication and testing, ARGUS shall include a physical log or manual record that identifies and tracks to resolution human factors issues including manpower, personnel, training, human factors engineering, and health & safety.	I, V		

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
	MOP 4-2-1. The human factors log documents, throughout the development cycle, issues related to manpower, personnel, training, human factors engineering, and health and safety. The log contains the date that an issue arose, the person assigned to investigate the issue, a description of the issue, the solution that was achieved, and the date of the solution. The log may be kept in an electronic or paper format.			
13	ARGUS shall permit direct personnel access to the main inspection enclosure to manually clear a bag jam in less than 30 seconds from time of discovery to resumption of inspection. MOP 5-1-1. Mean time for operators/bag handlers to clear a bag jam from the scanning chamber and resume bag inspection is less than 60 seconds.	I, V		
17	ARGUS shall contain a training package, completed by the end of Phase III, to create qualified operators. MOP 6-1-1. Training package is consistent with the SEIPT Uniform Training Requirements in appendix B. These requirements include modules for at least the Overview of Equipment Functions, Routine Use of Equipment, Alarm Processing, Standard Operating Procedures, Emergency and Safety Procedures, and On-the-Job Training. MOP 6-1-2. Training package is delivered to the ARGUS Human Factors Test Lead or designated representative at least one week in advance of the machine delivery date for certification testing at the FAA William J. Hughes Technical Center.	I, V		

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
	MOP 6-1-3. Training package contains one review quiz at the end of each module as well as a comprehensive final exam for classroom training. MOP 6-1-4. Terms and definitions described in the training materials are used consistently. MOP 6-1-5. Training materials include appropriate pictures, figures, and tables to supplement the text. MOP 6-1-6. Classroom training materials include examples of IEDs and explosive materials, as well as common objects that falsely generate machine alarms, as they appear outside of the scanner and when scanned. MOP 6-1-7. Training materials for OJT, which can consist of saved images on the machine or simulator or as live bags, include a minimum of 100 bag images. Two-thirds of these images are IED alarms and one-third of these images are false alarms. MOP 6-1-8. OJT IED image set contains examples made using commercial, military, and sheet explosives. MOP 6-1-9. OJT IED image set contains examples of bag as bomb, contained electronic/electrical, contained other, open, sympathetic, and shielded IEDs. MOP 6-1-10. IEDs are composed of explosives that range in size, with a minimum size equal to 75% and a maximum size of 150% of the current EDS certification standard weight. MOP 6-1-11. OJT is conducted in groups no larger than five trainees, during which time each trainee in the group receives multiple opportunities to resolve several bag images at a			

Req. No.	Requirement / MOPs	Test Method	Meets Req (Y / N)	Comments
	time on the machine or simulator. The instructor and group provide feedback to each trainee at this time. MOP 6-1-12. Student training manual text does not exceed an 8th grade reading level, which is equivalent to a score greater than or equal to 65 as calculated by the FRE formula. MOP 6-1-13. At least 70% of the original trainees receive a score of 80% or higher on the final written exam for classroom training (same as MOP 1-1-1). MOP 6-1-14. At least 70% of the trainees receive a Probability of Detection (Pd) of 0.60 or higher and a Probability of a False Alarm (Pfa) of 0.40 or below on the OJT final exam. MOP 6-1-15. At least 50% of the original trainees receive a passing score on the final written exam and on the OQT. The screener qualification standards are contained within a separate document [8] (same as MOP 1-1-3).			

APPENDIX B
SEIPT UNIFORM TRAINING REQUIREMENTS

SEIPT Uniform Training Requirements

SEPARATE COURSES

- Operator/Screener
- Supervisor
- Maintenance
- Train-the-Trainer
- Other, as appropriate

MATERIALS

- Materials should be suitable for classroom and/or small group presentation.
- Instructor Manual—Includes modules, as defined herein, and glossary of terms. The instructors manual shall include a clear outline of the training that specifies the level of proficiency a trainee is expected to achieve at the completion of the module (delete time to be allocated to each module).
- Classroom Aides—Viewgraphs, videos, etc. and instruction on use, to include scripting of images where used as part of the training
- Test Manual—Includes all testing materials and scoring keys and instruction for conducting tests. Test should be conducted per module. With a final test that incorporates all material form the total training package. All testing materials should be provided in easily reproducible format.
- All training materials should be provided with easy storage/shipping capability.

SIMULATORS (IF AVAILABLE)

- User's Manuals, system set up, installation manuals, and/or instructions to be provided.
- Storage/shipping case to be provided.

COMPUTER-BASED TRAINING (IF AVAILABLE)

- User's Manuals, system set up, installation manuals, and/or instructions to be provided.
- System to run on DOS/Windows-type system.

GUIDELINES

- Training and testing materials shall be developed using generally accepted Instructional Systems Design (ISD) and Human Factors (HF) guidelines and research.
- Training readability index not to exceed 8^{th} grade level—only use necessary technical terms.

MODULES

- Each module shall specify learning objectives, ensuring that all objectives are appropriately addressed in the test.
- Each module shall specify appropriate classroom aides.
- With a modular approach, certain modules should carry over to all groups—operators, supervisors, etc.—other modules will be for certain audiences. The training shall minimally include the following modules:

- Overview of Equipment Functions
  - Schematic / pictorial presentation of all operator interface elements with names clearly labeled.
  - Functional description of the operator interfaces with labeled diagrams of common hard and soft controls.
  - Overview of how equipment enhances and integrates into current security environment.
- Routine Use of Equipment
  - Detailed description of normal passenger / baggage processing procedures using the equipment.
  - Detailed description of informational interfaces, the location of information sources, and the proper use the operator should make of that information. The training shall include labeled reproductions of all the major informational interfaces.
  - Detailed description of operator control interfaces, the location of controls and the proper use of these controls in normal screening. The training shall include labeled reproductions of all the major control interfaces.
  - Detailed description of all threat and emergency alarms, the location and significance of all these indicators.
- Alarm Processing
  - A step-by-step overview of the alarm resolution process, including one or more flowcharts that outline each decision process. For multiple types of alarms the specific alarm resolution process will be detailed for each one.
  - A detailed temporally (logically) ordered treatment of each step in the alarm resolution process. Training in each step shall include:
    - A list of the precipitating conditions that lead to this step
    - The information needed to perform this step properly
    - A list of operator actions that can be taken in this step
    - The information that is made available by performing this step
    - The decisions that need to be made in this step
    - The step(s) that follow this step
  - Illustrative examples of alarm resolution with real case material. These examples should include pictorial information where visual information is critical. The quality of the information presented should be sufficient to illustrate the key elements of the case. There shall be examples of cases that result in both "clear" and "suspect" decisions. Detailed discussion and classroom exercises shall be provided for training in the decision making process.
  - Instruction in the common causes of false alarms, and misleading information.
- Standard Operating Procedures
  - Start-up, including cold start
  - Shutdown
  - Calibration
  - Routine Maintenance Procedures and Schedule
  - Detailed Maintenance/Troubleshooting Procedures (For Maintenance Class)

- Emergency / Safety Procedures
    - Detailed description of any safety equipment that is used (e.g. dosimeter badges etc.), and detailed instruction in its proper use.
    - Detailed description of any safety risks associated with operation of the equipment, and instructions in how to avoid hazardous situations using this equipment.
    - Location and operation of emergency shutdown switches.
    - Detailed description of any special equipment procedures to be followed in case of an emergency (fire etc.).
- On-the-Job Training
    - Detailed description of the on-the-job training

EDS Detailed Training Outline Example

Lesson 1—Introduction

- The Nature of the Threat and IEDs
- How Threats are Introduced at the Airport
- How Threats are Detected
- Checked Bag Screening
- The ARGUS and the Baggage System
- The Technology/Screener Team
- The ARGUS and the ARGUS Screener

Lesson 2— ARGUS Overview

- Purpose and Function of the ARGUS
- Screener's Responsibilities with the ARGUS
- Major Parts of the ARGUS
- Relation to Screening Bags
- X-ray versus CT Screening
- Explanation of CT
- ARGUS Safety Precautions
- Operating the ARGUS Console

Lesson 3—Image Interpretation and Object Recognition

- Concept of Slices
- Comparison of SP and CT
- Concept of Objects
- Concept of Smooth and Chunky (Homogeneity)
- Concept of Artifacts
- Concept of Aggregation
- Concept of Shields
- Objects in Bags

Lesson 4—IED Identification

- IED Overview
- IED Component Review
- Concept of Sequencing/Positioning of Detonator
- Possible IED Components Identification
- Images

Lesson 5—X-ray Screen Operations

- Screen and Image Area
- Color Coding of Threats
- Color Coding of Other Information (if applicable)
- Menu Soft Keys, Including Login
- Console Functions

- Screen Information Area

Lesson 6—CT Operations

- Screen and Image Area
- CT Images
- Information Area
- Menu Soft Keys
- Console Functions

Lesson 7—Alarm Resolution Protocols

- Instruction in Protocol
- Clear Decision Making at Each Step
- Routine Use of Additional Slices
- Emphasis on Detonator Detection
- Most Shield Suspected Quickly
- New Tools Including Job Aid

Lesson 8—Threat Resolution Procedures

- Definite Threats
- Possible Threat Items that Cannot be Resolved with the ARGUS
- Trace Procedures
- Physical Search Procedures
- Hazardous Materials

Lesson 9—Operational Procedures

- ARGUS Safety Review
- Warm and Cold Startup Procedure
- Loading and Unloading Bags
- Shutdown to Standby Mode
- Protocol for Power Down & Complete Shutdown
- Fault Recovery Procedures
- Operator Record Keeping Procedures

APPENDIX C
DATA COLLECTION FORMS

INFORMED CONSENT: PHASE 1

Please read this form and sign below if you agree to participate in the training course and complete the survey.

The purpose of your participation is to train you on how to use a new Explosive Detection System. Because this system is new, your participation will help the FAA learn how we can improve the training course. At the end of the course, you will complete two tests. One test is on paper and asks you questions about things you learned in class. In the second test, you will use the alarm resolution protocol steps from class to decide whether an alarm bag is a threat or a false alarm. There is no time limit for this test. After these tests, you will complete a survey with your opinion of the ARGUS training course so that we can make improvements. If you pass these two tests, then you will go on to Phase 2 and complete one final test. You will receive payment for your participation in this training and testing. If you have any questions or concerns about your participation, please contact Dr. Melissa Dixon, (609) 485-4684 or Michael Snyder (609) 485-5388.

I understand that any comments I provide will be combined with that of other individuals and I will no longer be identifiable as a participant. I have been informed that my name will remain CONFIDENTIAL.

I have been informed that I have the right not to complete the surveys. I also certify that I am at least 18 years of age and not pregnant.

I, _____, agree to participate in this training course, take the
Please print name here.
tests, and complete the survey.

Signature: _____

Date: _____/ _____/ _____

Witness: _____

Date: _____/ _____/ _____

EVALUATION OF ARGUS TRAINING COURSE

COMPLETED BY TRAINING OBSERVER

Date:	Training Site:	ARGUS Grantee:

Please circle the number that best describes your opinion.

	INSTRUCTOR	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	The instructor showed personal preparation.	1	2	3	4	5
2	The instructor was well organized.	1	2	3	4	5
3	The instructor knew the material well.	1	2	3	4	5
4	The instructor clearly stated training objectives.	1	2	3	4	5
5	The instructor knew how to operate the simulator.	1	2	3	4	5
6	The instructor used training aids and equipment effectively.	1	2	3	4	5
7	The instructor adequately explained the Alarm Resolution Protocol.	1	2	3	4	5
9	The instructor stressed that training information is Security Sensitive.	1	2	3	4	5
10	The instructor encouraged the class to ask questions.	1	2	3	4	5
11	The instructor answered questions from the class effectively.	1	2	3	4	5
12	The instructor provided feedback to students about their progress.	1	2	3	4	5
13	The instructor summarized key information at the end of each lesson.	1	2	3	4	5
14	The instructor provided a comprehensive evaluation to each member of the class at the end of training.	1	2	3	4	5

	COURSE MATERIALS	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	The Instructor Guide was available and designed to facilitate teaching of course materials.	1	2	3	4	5
2	The Student Guide was available to all trainees.	1	2	3	4	5
3	The Student Guide clearly explains key terms, machine functions, and operator procedures.	1	2	3	4	5
4	The Student Guide is written at an appropriate reading level.	1	2	3	4	5
5	The Student Guide uses terms consistently throughout.	1	2	3	4	5
6	The Student Guide makes good use of illustrations.	1	2	3	4	5
7	The visual material effectively conveyed information to the trainees.	1	2	3	4	5
8	An adequate number of IED examples were shown to the trainees in class.	1	2	3	4	5
11	An adequate number of common objects that could be altered to make IEDs were shown to the trainees in class.	1	2	3	4	5
12	An adequate number of false alarm examples were shown to trainees in class.	1	2	3	4	5
13	All of the functions on the machine all worked properly.	1	2	3	4	5
14	The images are presented in a logical order.	1	2	3	4	5
15	The exams and quizzes sufficiently covered the important topics taught in class.	1	2	3	4	5

	TRAINEES	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	Trainees actively participated in classroom training.	1	2	3	4	5
2	Trainees actively participated in machine training.	1	2	3	4	5
3	Trainees were able to achieve course objectives satisfactorily.	1	2	3	4	5
4	Trainees had very little difficulty understanding Alarm Resolution Protocol.	1	2	3	4	5
5	Trainees had very little difficulty utilizing Alarm Resolution Protocol.	1	2	3	4	5
6	Trainees were able to interpret and answer end-of-lesson questions.	1	2	3	4	5
7	Trainees were able to achieve a passing score on the final examination.	1	2	3	4	5
8	At the conclusion of training, it was clear that trainees were able to understand the purpose, function, and operation of the ARGUS system.	1	2	3	4	5
9	Trainees liked using the machine.	1	2	3	4	5
10	Trainees were able to use all of the functions on the machine console/interface with little difficulty.	1	2	3	4	5

EVALUATION OF ARGUS TRAINING COURSE

COMPLETED BY TRAINEE

Date:	Training Site:	ARGUS Grantee:

Please circle the number that best describes your opinion.

		Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	The information and procedures taught in this training will help me to do my job well.	1	2	3	4	5
2	The Job Aid introduced in this training will help me to do my job better.	1	2	3	4	5
3	I feel that I know how to use the ARGUS functions well	1	2	3	4	5
4	I feel that I know how to use the alarm resolution protocol well.	1	2	3	4	5
5	The instructor explained the ARGUS functions clearly.	1	2	3	4	5
6	The instructor explained the alarm resolution protocol clearly.	1	2	3	4	5
7	I feel that enough examples of IEDs were shown in class.	1	2	3	4	5
8	I feel that enough examples of how common objects can be altered into IEDs were shown in class.	1	2	3	4	5
9	Using the machine helped me understand how to operate the ARGUS.	1	2	3	4	5
10	I learned that the alarm resolution protocol is Security Sensitive information.	1	2	3	4	5
11	The Student Guide was easy to understand.	1	2	3	4	5

See next page for more questions.

EVALUATION OF ARGUS TRAINING COURSE COMPLETED BY TRAINEE, CONT.

Date:	Training Site:	ARGUS Grantee:

13. The most difficult parts of the alarm resolution protocol are:

14. The easiest parts of the alarm resolution protocol are:

15. The most difficult functions on the machine are:

16. The easiest functions on the machine are:

17. Other information that should be included in this training is:

18. What is your opinion of the quality of the training materials, including the student guide, the slides, the protocol, and the quizzes and tests?

19. Please provide any other comments about the instructor or the training:

Thank you for your input!

INFORMED CONSENT: PHASE 2

Please read this form and sign below if you agree to participate.

Because you passed the tests at the end of ARGUS training, the FAA would like for you to participate in another test. In this test you will use the alarm resolution protocol steps from class to decide whether an alarm bag is a threat or a false alarm. You should resolve each alarm bag as quickly as possible, but you should still use the protocol to make an accurate decision. Both tests will allow the FAA to determine how well the ARGUS training program trained you to become an operator. Your participation will help us learn how to improve the training for this important new machine. You will be paid for your participation in this test. If you have any questions or concerns about this test, please contact Dr. Melissa Dixon, (609) 485-4684 or Michael Snyder (609) 485-5388.

I understand that my responses will be combined with the responses of other individuals and I will no longer be identifiable as a participant. I have been informed that my name will remain CONFIDENTIAL. I understand that the FAA will <u>not</u> use my responses in these exercises to penalize me in any way.

I have been informed that I have the right not to complete these tasks and I have been provided with the opportunity to ask questions. I also certify that I am at least 18 years of age.

I, _____, agree to participate in the test described above.
Please print name here.

Signature: _____

Date: _____/ _____/ _____

Witness: _____

Date: _____/ _____/ _____

PHASE 2 DATA COLLECTION FORM

Date:	Site:	ARGUS Grantee:	
Operator:	Data Collector:	Start Time:	End Time:

FAA Bag #	Machine Bag #	Time In	Time Out	Decision (C / S)	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
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18					
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21					
22					
23					
24					
25					
26					

PHASE 2 DATA COLLECTION FORM, CONT.

Date:	Site:	ARGUS Grantee:	
Operator:	Data Collector:	Start Time:	End Time:

FAA Bag #	Machine Bag #	Time In	Time Out	Decision (C / S)	Comments
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
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50					
51					
52					
53					

PHASE 2 DATA COLLECTION FORM, CONT.

Date:	Site:	ARGUS Grantee:	
Operator:	Data Collector:	Start Time:	End Time:

FAA Bag #	Machine Bag #	Time In	Time Out	Decision (C / S)	Comments
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
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