U.S. Department of Homeland Security
601 South 12th Street
Arlington, VA 20598-6017

Transportation Security Administration

May 23, 2012

Mr. F. Mark Momsen
Federal Security Director
Transportation Security Administration
El Paso International Airport (ELP)

Dear Mr. Momsen:

The TSA Occupational Safety, Health, and Environment (OSHE) Division is sponsoring an independent radiation protection survey project of general-use backscatter x-ray advanced imaging technology (AIT) systems and cabinet x-ray systems through an interagency agreement with the U.S. Army Public Health Command (USAPHC). This survey project is not to be confused with the radiation surveys performed during preventive maintenance service. The preventive maintenance radiation surveys are conducted at least annually by certified equipment maintenance personnel under specific testing conditions, whereas the survey project is conducted by USAPHC personnel under normal operating conditions; e.g., baggage flow-through or passenger screening with TSOs in attendance.

As part of the survey project, a radiation protection survey of selected general-use backscatter x-ray AIT and cabinet x-ray systems used at TSA ELP was conducted on January 25-26, 2012, by a team of health physicists from USAPHC's Health Physics Program, Army Institute of Public Health. The purpose of the survey was to ensure that the general-use backscatter x-ray AIT systems comply with the requirements of ANSI/HPS N43.17-2009, that the cabinet x-ray systems comply with the Food and Drug Administration's Performance Standards for Ionizing Radiation Emitting Products under Title 21, CFR, Subchapter J (21 CFR 1020.40 Cabinet x-ray systems), and to identify any health hazards associated with the use of either of these x-ray systems.

*General-use Backscatter X-ray AIT Systems*

The results for the surveyed AIT systems are described on pages 2 and 3 of the attached report and in applicable survey worksheets (Enclosure 1 of attached report), and are summarized as follows:

A total of three general-use backscatter x-ray AIT systems were surveyed and found to be in compliance with the radiation dose limits specified in ANSI/HPS N43.17-2009. There are no health hazards associated with the use of these general-use backscatter x-ray AIT systems provided appropriate operating procedures are followed. In addition, the general-use backscatter x-ray AIT systems were in compliance with other (non-emission) requirements of ANSI/HPS N43.17-2009.

Several administrative items were noted by the survey officers during the AIT surveys, specifically the presence of loud idle and travel noises in the slave unit of one system, misalignment of the master and slave units in another system, and unlocked access panels. It was recommended to have the maintenance service provider check the cause of the noises and the misalignment during the next

scheduled visit. For specific details, see paragraphs (d) through (f) starting in the bottom half of page 2 of the attached report.

*Cabinet X-ray Systems*

The findings for the surveyed cabinet x-ray systems are described on pages 2 and 3 of the attached report and in the survey worksheets (Enclosure 2 of the attached report), and are summarized as follows:

A total of 7 cabinet x-ray systems were surveyed and found to be in compliance with the emissions limit specified in Title 21, CFR, Subchapter J, Section 1020.40. There are no health hazards associated with the use of these cabinet x-ray systems provided appropriate operating procedures are followed.

The cabinet x-ray systems complied with other (non-emission) requirements of Title 21, CFR, Subchapter J, Section 1020.40, with the exception of (1) unavailability of a user's manuals at any of the checkpoint cabinet x-ray systems, (2) unreadable labels on select systems, and (3) one serial number mismatch between the label and the corresponding number on the TSA ELP inventory list. The affected systems are described in paragraphs (a) through (c) in the top half of page 2 of the attached report.

In addition, several administrative items were found related to the cabinet x-ray system and noted in paragraphs (a) and (b) on the bottom half of page 2 of the attached report, concerning lack of posted survey dates and worn lead curtains. Also, some of the leaded curtains do not appear to be of uniform thickness, which should be investigated to ensure the systems meet manufacturer specifications.

Your early attention to correcting the identified findings is requested. Please contact the TSA Service Response Center at 1-800-820-8535 for assistance, and advise me of progress via email by June 23, 2012, or when the corrections are completed, whichever is sooner.

If you have questions or comments about the report's contents, please direct them to me at [redacted].

Sincerely,

Jill M. Segraves, CSP
Director
Occupational Safety, Health, and Environment Division

cc: Mr. James Feely, TSA ELP Assistant FSD - Screening
Ms. Christine Halfacre, Chief of Staff, Office of Security Technology

Enclosure: TSA ELP Radiation Protection Survey Report, dated 15 May 2012

DEPARTMENT OF THE ARMY
US ARMY INSTITUTE OF PUBLIC HEALTH
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MD 21010-5403

15 MAY 2012

Health Physics Program

Ms. Jill Segraves
Transportation Security Administration
TSA-170SHE
601 South 12th Street
Arlington, Virginia 22202

Dear Ms. Segraves:

This letter is in reference to the Memorandum of Agreement between the U.S. Army Medical Command and the Transportation Security Administration (TSA), signed September 10, 2008; electronic mail message, subject: 2400.2.1 TSA El Paso International Airport (ELP) Radiation Safety Surveys, January 19, 2012; American National Standards Institute/Health Physics Society (ANSI/HPS) N43.17-2009; and Title 21, Code of Federal Regulations (CFR), Subchapter J.

A radiation protection survey was performed on January 25-26, 2012 at ELP, El Paso, TX, Project No. 26-MF-0FRW-12. The survey was performed to:

a. Evaluate the advanced imaging technology (AIT) x-ray systems to ensure compliance with the requirements of ANSI/HPS N43.17-2009.

b. Evaluate selected cabinet x-ray systems to ensure compliance with the requirements of Title 21, CFR, Subchapter J.

c. Identify any health hazards associated with the use of these x-ray systems.

d. Provide recommendations to assist in correcting any areas of regulatory noncompliance or health hazards.

The survey was performed by [redacted], Health Physicist, Health Physics Program, Army Institute of Public Health (AIPH); and [redacted] Certified Health Physicist, Consolidated Safety Services. A total of three AIT x-ray systems were evaluated for compliance with the requirements of ANSI/HPS N43.17-2009 and seven cabinet x-ray systems were evaluated for compliance with the requirements of Title 21, CFR, Subchapter J. The survey results for each AIT system are provided in Enclosure 1. The survey results for each cabinet x-ray system are provided in Enclosure 2. Note: There were two additional cabinet x-ray systems that were inoperable at the time of the survey. They were located at the consolidated checkpoint, Lane 1 and Lane 2.

All AIT x-ray systems tested were found to be in compliance with the radiation dose limits specified in ANSI/HPS N43.17-2009. All cabinet x-ray systems tested were found to be in compliance with the emissions limit specified in Title 21, CFR, Subchapter J. There are no health hazards associated with the use of these systems provided appropriate operating procedures are followed.

All AIT systems surveyed were found to be in compliance with the other requirements of ANSI/HPS N43.17-2009.

All cabinet x-ray systems were found to be in compliance with the other requirements of Title 21, CFR, Subchapter J, with the following exceptions:

a. At the time of the survey a user's manual was not available for any of the checkpoint cabinet x-ray systems.

b. The labels listing the model number, serial number, and the date of manufacture were unreadable on the cabinet x-ray systems located at consolidated checkpoint, Lanes 1 and 5.

c. The serial number listed on the label on the cabinet x-ray system located at consolidated checkpoint location Lane 4 had differed from the serial number listed on the TSA ELP inventory list. The inventory list identified it as serial number 7041<u>7</u>04 and the label identified it as serial number 7041<u>N</u>04.

In addition, the survey officers noted the following administrative items during the surveys:

a. A service provider survey date was not posted on any of the Reveal CT-80 DR systems.

b. For the Reveal CT-80 DR (SN 040576, American Airlines Checked Baggage), the entrance port leaded curtains were worn. The survey officers recommend the leaded curtains be replaced.

c. The leaded curtains on the CT-80 DR systems were not all the same thickness. The survey officers recommend that all the Reveal CT-80 DRs curtains be inspected to verify all curtains installed meet the manufacturer specifications.

d. Rapiscan Secure 1000 SP, SN S51005007, Lane 1: The slave unit made unusually loud idle and travel noises. Request that the service provider check during next visit. The master unit access door was unlocked. The door was locked prior to the end of this visit.

e. Rapsican Secure 1000 SP, SN S51005008, Lane 2: The master unit and the slave unit were misaligned with one another. This caused an increase in scatter radiation at the exit point on the slave unit side and on the entrance point on the master unit side. Request that the service provider realign the two units. The master unit access door was unlocked. The door was locked prior to the end of this visit.

f. Rapiscan Secure 1000 SP, SN S51005010, Lane 3: The master unit access door was unlocked. The door was locked prior to the end of this visit.

Based on dosimetry and field measurements around the Secure 1000 SP and cabinet x-ray systems, it is estimated that Transportation Security Officers will receive a radiation dose of less than 10 millirem per year. For comparison, the occupational limit under Occupational Safety and Health Administration regulations is 1,250 millirem per quarter (5,000 millirem per year). The goal of the TSA radiation safety program is to keep all exposure less than 100 millirem per year.

The survey officers discussed the survey results with Mr. Mark Momsen, Federal Security Director (FSD); Mr. James Feely, Assistant FSD for Screening; Mr. Frederick Baker, Transportation Security Manager (TSM); Mr. Pilo Ramirez, TSM for Screening; Ms. Estella Clary, TSM; and Ms. Susan Deemer, Administrator Officer, on January 26, 2012. A copy of the survey notes is provided in Enclosure 3.

For more information concerning the survey, please contact the AIPH, Health Physics Program, at [redacted]

Sincerely,

[redacted]

Portfolio Director
Occupational Health Sciences

Enclosures

Survey Results for Three AIT X-Ray Systems

**Encl 1**

# Survey Worksheet - AIT X-Ray Systems

*Health Physics Program*
*U.S. Army Public Health Command*
*Aberdeen Proving Ground, Maryland 21010-5403*

## SURVEY DATA

| | |
|---|---|
| Project No. | 26-MF-0FRW-12 |
| Survey Date | 25 Jan 2012 |
| Surveyor(s) | [redacted] |

## SURVEY LOCATION

| | | | | | |
|---|---|---|---|---|---|
| Location | Consolidated Checkpoint, Lane 1 | | | | |
| Organization | El Paso Intl Airport | | | | |
| Street Address | 6701 Convair Road | | | | |
| City/Installation | El Paso | State | Texas | ZIP | 79925 |

## INSTRUMENTS USED

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #1 | Radcal | 9010 | 90-3378 | 30 Sep 2012 |
| Instrument #2 | Radcal | 10X5-1800 | 17959 | 30 Sep 2012 |
| Instrument #3 | | | | |

## SYSTEM INFORMATION

| Manufacturer | Model | Serial No. | Manuf. Date |
|---|---|---|---|
| Rapiscan | Secure 1000 SP | S51005007 | Feb 2010 |

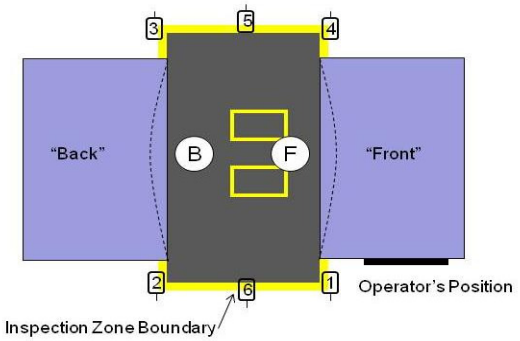
| | | | |
|---|---|---|---|
| *Certified* | NA | *Place of Manufacture* | Torrance, CA |
| *Service Provider Survey Date* | 8 Jun 2011 | | |

## VISUAL INSPECTION

| Y | N | Requirement | Y | N | Requirement |
|---|---|---|---|---|---|
| X | | Key activated control with key capture? (ANSI N43.17-2009, paragraph 7.2.1.c) | X | | At least one lighted scan in progress indicator visible from the inspection zone? (ANSI N43.17-2009, paragraph 7.2.1.b) |
| X | | "Caution: X-Rays Produced When Energized" label present at control to initiate scan? (ANSI N43.17-2009, paragraph 7.2.2.d) | X | | X-ray emission terminates after a preset time or exposure? (ANSI N43.17-2009, paragraph 7.2.2.e) |
| X | | Technique factors preset for each mode of operation? (ANSI N43.17-2009, paragraph 7.2.2.b) | X | | Operators have a clear view of the scanning area? (ANSI N43.17-2009, paragraph 7.2.1.f) |
| X | | Means to initiate emission of radiation other than an interlock or main power control? (ANSI N43.17-2009, paragraph 7.2.1.d) | X | | Tool or key required to open or remove access panels? (ANSI N43.17-2009, paragraph 7.2.1.i) |
| X | | Means to terminate emission of radiation other than an interlock? (ANSI N43.17-2009, paragraph 7.2.1.e) | X | | User provided with required information? (ANSI N43.17-2009, paragraph 7.5) |
| X | | Scan in progress indicator visible for any location from which a scan can be initiated? (ANSI N43.17-2009, paragraph 7.2.1.a) | | | |

NT=not tested; NA=not applicable.

## SURVEY DIAGRAM




## SCANNING MEASUREMENTS

Scanning below action levels? Yes [X] No [ ]
(If no, explain in comments)

*Inspection zone boundary scanned with Instruments #4 & #5.*

## SCATTERED RADIATION (Optional)

| Location | Scan 1 | Scan 2 | Scan 3 | Average |
|---|---|---|---|---|
| #1 | 0.00 µR | 0.00 µR | 0.00 µR | 0.00 µR |
| #2 | 0.00 µR | 0.00 µR | 0.00 µR | 0.00 µR |
| #3 | 0.00 µR | 0.00 µR | 0.00 µR | 0.00 µR |
| #4 | 0.00 µR | 0.00 µR | 0.00 µR | 0.00 µR |
| #5 | 0.00 µR | #6 | 0.00 µR | |

*Measurements made with Instruments #1 & #2*

## DOSE PER SCREENING

| Trial | Exposure (X) "Front" Side | "Back" Side |
|---|---|---|
| a | 6.32 µR | 6.47 µR |
| b | 6.34 µR | 6.47 µR |
| c | 6.32 µR | 6.55 µR |
| d | 6.32 µR | 6.47 µR |
| e | 6.40 µR | 6.47 µR |
| AVG | 6.34 µR | 6.49 µR |

Energy Correction Factor: 1.25

Reference Effective Dose per Screening (max 25 µrem): 2.0 µrem or 0.020 µSv

**RESULT** **PASS**

*Measurements made with Instruments #1 & #2*

## BEAM QUALITY

| mm Al | Exposure (X) "Front" Side | "Back" Side |
|---|---|---|
| 0 | 2.06 µR | 1.96 µR |
| 0 | 1.99 µR | 1.96 µR |
| 1 | 1.03 µR | 1.06 µR |
| 1 | 1.03 µR | 1.05 µR |
| 1.5 | 0.81 µR | 0.76 µR |
| 1.5 | 0.74 µR | 0.82 µR |

| | |
|---|---|
| HVL "Front" Side | 1.0 mm Al |
| HVL "Back" Side | 1.1 mm Al |
| Conversion Factor | 0.124 |
| Min. Filtration[1] | 1.0 mm Al |

[1] An HVL of 1 mm Al corresponds to a filtration of 1 mm Al for this system

**RESULT** **PASS**

*Measurements made with Instruments #1 & #2*

## COMMENTS AND RECOMMENDATIONS

The slave unit made unusually loud idle and travel noises. Request the service provider check the system during next visit.

Additional Instruments Used:

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #4 | Ludlum | Model 3 | 286054 | 27 Sep 2012 |
| Instrument #5 | Ludlum | Model 44-9 | PR306984 | 27 Sep 2012 |

* Instruments #4 and #5 were response checked before and after the survey.

# Survey Worksheet - AIT X-Ray Systems

*Health Physics Program*
*U.S. Army Public Health Command*
*Aberdeen Proving Ground, Maryland 21010-5403*

## SURVEY DATA

| | |
|---|---|
| Project No. | 26-MF-0FRW-12 |
| Survey Date | 25 Jan 2012 |
| Surveyor(s) | [redacted] |

## SURVEY LOCATION

| | | | | | |
|---|---|---|---|---|---|
| Location | Consolidated Checkpoint, Lane 2 | | | | |
| Organization | El Paso Intl Airport | | | | |
| Street Address | 6701 Convair Road | | | | |
| City/Installation | El Paso | State | Texas | ZIP | 79925 |

## INSTRUMENTS USED

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #1 | Radcal | 9010 | 90-3378 | 30 Sep 2012 |
| Instrument #2 | Radcal | 10X5-1800 | 17959 | 30 Sep 2012 |
| Instrument #3 | | | | |

## SYSTEM INFORMATION

| Manufacturer | Model | Serial No. | Manuf. Date |
|---|---|---|---|
| Rapiscan | Secure 1000 SP | S51005008 | Feb 2010 |

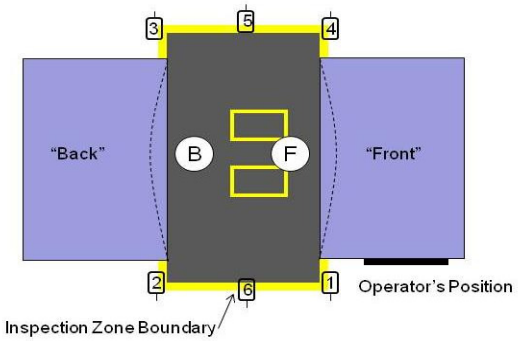
| | | | |
|---|---|---|---|
| *Certified* | NA | *Place of Manufacture* | Torrance, CA |
| *Service Provider Survey Date* | 14 Jun 2011 | | |

## VISUAL INSPECTION

| Y | N | Requirement |
|---|---|---|
| X | | Key activated control with key capture? (ANSI N43.17-2009, paragraph 7.2.1.c) |
| X | | "Caution: X-Rays Produced When Energized" label present at control to initiate scan? (ANSI N43.17-2009, paragraph 7.2.2.d) |
| X | | Technique factors preset for each mode of operation? (ANSI N43.17-2009, paragraph 7.2.2.b) |
| X | | Means to initiate emission of radiation other than an interlock or main power control? (ANSI N43.17-2009, paragraph 7.2.1.d) |
| X | | Means to terminate emission of radiation other than an interlock? (ANSI N43.17-2009, paragraph 7.2.1.e) |
| X | | Scan in progress indicator visible for any location from which a scan can be initiated? (ANSI N43.17-2009, paragraph 7.2.1.a) |
| X | | At least one lighted scan in progress indicator visible from the inspection zone? (ANSI N43.17-2009, paragraph 7.2.1.b) |
| X | | X-ray emission terminates after a preset time or exposure? (ANSI N43.17-2009, paragraph 7.2.2.e) |
| X | | Operators have a clear view of the scanning area? (ANSI N43.17-2009, paragraph 7.2.1.f) |
| X | | Tool or key required to open or remove access panels? (ANSI N43.17-2009, paragraph 7.2.1.i) |
| X | | User provided with required information? (ANSI N43.17-2009, paragraph 7.5) |

NT=not tested; NA=not applicable.

## SURVEY DIAGRAM




## SCANNING MEASUREMENTS

Scanning below action levels? Yes [X] No [ ]
(If no, explain in comments)

*Inspection zone boundary scanned with Instruments #4 & #5.*

## SCATTERED RADIATION (Optional)

| Location | Scan 1 | Scan 2 | Scan 3 | Average |
|---|---|---|---|---|
| #1 | 0.00 µR | 0.07 µR | 0.00 µR | 0.02 µR |
| #2 | 0.22 µR | 0.22 µR | 0.22 µR | 0.22 µR |
| #3 | 0.07 µR | 0.07 µR | 0.07 µR | 0.07 µR |
| #4 | 0.15 µR | 0.15 µR | 0.22 µR | 0.17 µR |
| #5 | 0.07 µR | #6 | 0.07 µR | |

*Measurements made with Instruments #1 & #2*

## DOSE PER SCREENING

| Trial | Exposure (X) "Front" Side | "Back" Side |
|---|---|---|
| a | 6.50 µR | 5.16 µR |
| b | 6.43 µR | 5.91 µR |
| c | 6.50 µR | 5.98 µR |
| d | 6.50 µR | 5.98 µR |
| e | 6.44 µR | 5.98 µR |
| AVG | 6.47 µR | 5.80 µR |

Energy Correction Factor: 1.25

Reference Effective Dose per Screening (max 25 µrem):
2.0 µrem
**or**
0.020 µSv

**RESULT** **PASS**

*Measurements made with Instruments #1 & #2*

## BEAM QUALITY

| mm Al | Exposure (X) "Front" Side | "Back" Side |
|---|---|---|
| 0 | 1.78 µR | 1.93 µR |
| 0 | 1.79 µR | 1.93 µR |
| 1 | 0.97 µR | 1.04 µR |
| 1 | 0.90 µR | 1.04 µR |
| 1.5 | 0.75 µR | 0.81 µR |
| 1.5 | 0.67 µR | 0.74 µR |

HVL "Front" Side: **1.1** mm Al
HVL "Back" Side: **1.1** mm Al
Conversion Factor: **0.124**
Min. Filtration[1]: **1.0 mm Al**

[1] An HVL of 1 mm Al corresponds to a filtration of 1 mm Al for this system

**RESULT** **PASS**

*Measurements made with Instruments #1 & #2*

## COMMENTS AND RECOMMENDATIONS

Note: The two units are misaligned, causing slightly elevated scatter radiation measurements at locations #2 and #4. Request the service provide realign the units.

Additional Instruments Used:

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #4 | Ludlum | Model 3 | 286054 | 27 Sep 2012 |
| Instrument #5 | Ludlum | Model 44-9 | PR306984 | 27 Sep 2012 |

* Instruments #4 and #5 were response checked before and after the survey.

# Survey Worksheet - AIT X-Ray Systems

*Health Physics Program*
*U.S. Army Public Health Command*
*Aberdeen Proving Ground, Maryland 21010-5403*

## SURVEY DATA

| | |
|---|---|
| Project No. | 26-MF-0FRW-12 |
| Survey Date | 25 Jan 2012 |
| Surveyor(s) | [redacted] |

## SURVEY LOCATION

| | | | | | |
|---|---|---|---|---|---|
| Location | Consolidated Checkpoint, Lane 3 | | | | |
| Organization | El Paso Intl Airport | | | | |
| Street Address | 6701 Convair Road | | | | |
| City/Installation | El Paso | State | Texas | ZIP | 79925 |

## INSTRUMENTS USED

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #1 | Radcal | 9010 | 90-3378 | 30 Sep 2012 |
| Instrument #2 | Radcal | 10X5-1800 | 17959 | 30 Sep 2012 |
| Instrument #3 | | | | |

## SYSTEM INFORMATION

| Manufacturer | Model | Serial No. | Manuf. Date |
|---|---|---|---|
| Rapiscan | Secure 1000 SP | S51005010 | Feb 2010 |

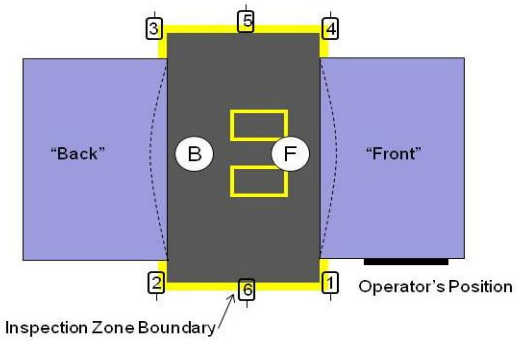
| | | | |
|---|---|---|---|
| *Certified* | NA | *Place of Manufacture* | Torrance, CA |
| *Service Provider Survey Date* | 10 Jun 2011 | | |

## VISUAL INSPECTION

| Y | N | Requirement |
|---|---|---|
| X | | Key activated control with key capture? (ANSI N43.17-2009, paragraph 7.2.1.c) |
| X | | "Caution: X-Rays Produced When Energized" label present at control to initiate scan? (ANSI N43.17-2009, paragraph 7.2.2.d) |
| X | | Technique factors preset for each mode of operation? (ANSI N43.17-2009, paragraph 7.2.2.b) |
| X | | Means to initiate emission of radiation other than an interlock or main power control? (ANSI N43.17-2009, paragraph 7.2.1.d) |
| X | | Means to terminate emission of radiation other than an interlock? (ANSI N43.17-2009, paragraph 7.2.1.e) |
| X | | Scan in progress indicator visible for any location from which a scan can be initiated? (ANSI N43.17-2009, paragraph 7.2.1.a) |
| X | | At least one lighted scan in progress indicator visible from the inspection zone? (ANSI N43.17-2009, paragraph 7.2.1.b) |
| X | | X-ray emission terminates after a preset time or exposure? (ANSI N43.17-2009, paragraph 7.2.2.e) |
| X | | Operators have a clear view of the scanning area? (ANSI N43.17-2009, paragraph 7.2.1.f) |
| X | | Tool or key required to open or remove access panels? (ANSI N43.17-2009, paragraph 7.2.1.i) |
| X | | User provided with required information? (ANSI N43.17-2009, paragraph 7.5) |

NT=not tested; NA=not applicable.

## SURVEY DIAGRAM




## SCANNING MEASUREMENTS

Scanning below action levels? Yes [X] No [ ]
(If no, explain in comments)

*Inspection zone boundary scanned with Instruments #4 & #5.*

## SCATTERED RADIATION (Optional)

| Location | Scan 1 | Scan 2 | Scan 3 | Average |
|---|---|---|---|---|
| #1 | 0.00 µR | 0.00 µR | 0.00 µR | 0.00 µR |
| #2 | 0.00 µR | 0.00 µR | 0.00 µR | 0.00 µR |
| #3 | 0.00 µR | 0.00 µR | 0.00 µR | 0.00 µR |
| #4 | 0.00 µR | 0.00 µR | 0.00 µR | 0.00 µR |
| #5 | 0.00 µR | #6 | 0.00 µR | |

*Measurements made with Instruments #1 & #2*

## DOSE PER SCREENING

| Trial | Exposure (X) "Front" Side | "Back" Side |
|---|---|---|
| a | 6.54 µR | 6.62 µR |
| b | 6.55 µR | 6.62 µR |
| c | 6.54 µR | 6.55 µR |
| d | 6.55 µR | 6.55 µR |
| e | 6.55 µR | 6.48 µR |
| AVG | 6.55 µR | 6.56 µR |

Energy Correction Factor: 1.25

Reference Effective Dose per Screening (max 25 µrem): 1.9 µrem or 0.019 µSv

**RESULT: PASS**

*Measurements made with Instruments #1 & #2*

## BEAM QUALITY

| mm Al | Exposure (X) "Front" Side | "Back" Side |
|---|---|---|
| 0 | 1.34 µR | 1.35 µR |
| 0 | 1.34 µR | 1.27 µR |
| 1 | 0.67 µR | 0.68 µR |
| 1 | 0.67 µR | 0.68 µR |
| 1.5 | 0.52 µR | 0.53 µR |
| 1.5 | 0.52 µR | 0.53 µR |

HVL "Front" Side: **1.0** mm Al
HVL "Back" Side: **1.1** mm Al
Conversion Factor: **0.118**
Min. Filtration[1]: **1.0 mm Al**

[1] An HVL of 1 mm Al corresponds to a filtration of 1 mm Al for this system

**RESULT: PASS**

*Measurements made with Instruments #1 & #2*

## COMMENTS AND RECOMMENDATIONS

Additional Instruments Used:

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #4 | Ludlum | Model 3 | 286054 | 27 Sep 2012 |
| Instrument #5 | Ludlum | Model 44-9 | PR306984 | 27 Sep 2012 |

* Instruments #4 and #5 were response checked before and after the survey.

Survey Results for Seven Cabinet X-Ray Systems

**Encl 2**

# Survey Worksheet - Cabinet X-Ray Systems

*Health Physics Program*
*U.S. Army Public Health Command*
*Aberdeen Proving Ground, Maryland 21010-5403*

| SURVEY DATA | | SURVEY LOCATION | | | | | |
|---|---|---|---|---|---|---|---|
| Project No. | 26-MF-0FRW-12 | Location | Consolidated Checkpoint, Lane 3 | | | | |
| Survey Date | 25 Jan 2012 | Organization | El Paso Intl Airport | | | | |
| Surveyor(s) | [redacted] | Street Address | 6701 Convair Road | | | | |
| | [redacted] | City/Installation | El Paso | State | Texa | ZIP | 79925 |

| INSTRUMENTS USED | | | | |
|---|---|---|---|---|
| | *Manufacturer* | *Model* | *Serial No.* | *Cal. Due* |
| Instrument #1 | Radcal | 9010 | 90-3378 | 30 Sep 2012 |
| Instrument #2 | Radcal | 10X5-1800 | 17959 | 30 Sep 2012 |
| Instrument #3 | Radcal | 10X5-180 | 18999 | 30 Sep 2012 |
| Instrument #4 | | | | |

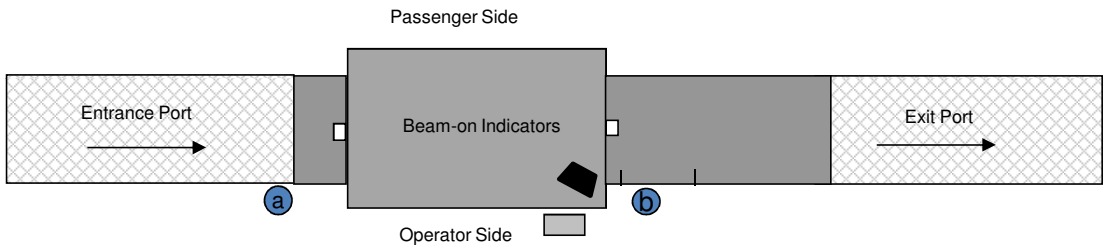
| SYSTEM INFORMATION | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Manufacturer* | | *Model* | | *Serial No.* | | *Manuf. Date* | | | |
| Rapiscan | | 520B | | 7033306 | | Aug 2003 | | | |
| *Certified* | Yes | X | No | | *Place of Manufacture* | Hawthorne, CA | | | |
| *Type* | Checkpoint | X | EDS: | In-line | | Stand-Alone | | | |
| *Manufacturer Survey Date* | 7 Jul 2011 | | | | | | | | |

## VISUAL INSPECTION

| Y | N | *Requirement* |
|---|---|---|
| X | | Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i)) |
| X | | Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? (21 CFR 1020.40(c)(8)(ii)) |
| X | | Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii)) |
| X | | One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv)) |
| X | | Key Activated Control present? (21 CFR 1020.40(c)(6)(i)) |
| X | | Means to require operator presence at control panel? (21 CFR 1020.40(c)(10)) |
| X | | Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii)) |
| X | | Leaded drapes in good condition? |
| X | | Interlocks not bypassed? |
| | X | Current User's Manual available? (21 CFR 1020.40(c)(9)) |
| X | | Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9)) |

NT=not tested; NA=not applicable.

## SURVEY DIAGRAM




Accessible exterior surfaces scanned with Instruments #5 and #6. All scanning results below action levels? Yes X No (If no, explain below)

## DOSE TO BAGGAGE

| *Trial* | *Exposure ($X_i$)* | |
|---|---|---|
| 1 | 99.04 | µR |
| 2 | 96.57 | µR |
| 3 | 97.36 | µR |
| 4 | 99.51 | µR |
| 5 | 99.51 | µR |

| | | |
|---|---|---|
| $X_{avg}$ | 98.4 | µR |
| CV | 0.0137 | |

Coefficient of Variation (CV):

$CV = (1/X_{avg})(\Sigma(X_i - X_{avg})^2/(n-1))^{1/2}$

## EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 µR

| *Location* | *Exposure* | | *Time* | | *Exposure in 1 hr* | | RESULT |
|---|---|---|---|---|---|---|---|
| a | 0.00 | µR | 5.0 | min | 0.000 | mR | PASS |
| b | 1.20 | µR | 5.0 | min | 0.014 | mR | PASS |
| c | | µR | | min | | mR | |
| d | | µR | | min | | mR | |
| e | | µR | | min | | mR | |

## COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#2 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
User Manual was not available at the time of the survey. The AO believes it is locked inside one of the panel doors.

Additional Instruments Used:

| | *Manufacturer* | *Model* | *Serial No.* | *Cal. Due* |
|---|---|---|---|---|
| Instrument #5 | Ludlum | Model 3 | 286054 | 27 Sep 2012 |
| Instrument #6 | Ludlum | Model 44-9 | PR306984 | 27 Sep 2012 |

* Instruments #5 and #6 were response checked before and after the survey.

# Survey Worksheet - Cabinet X-Ray Systems

*Health Physics Program*
*U.S. Army Public Health Command*
*Aberdeen Proving Ground, Maryland 21010-5403*

## SURVEY DATA

| | |
|---|---|
| Project No. | 26-MF-0FRW-12 |
| Survey Date | 25 Jan 2012 |
| Surveyor(s) | [redacted] |

## SURVEY LOCATION

| | | | | | |
|---|---|---|---|---|---|
| Location | Consolidated Checkpoint, Lane 4 | | | | |
| Organization | El Paso Intl Airport | | | | |
| Street Address | 6701 Convair Road | | | | |
| City/Installation | El Paso | State | Texa | ZIP | 79925 |

## INSTRUMENTS USED

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #1 | Radcal | 9010 | 90-3378 | 30 Sep 2012 |
| Instrument #2 | Radcal | 10X5-1800 | 17959 | 30 Sep 2012 |
| Instrument #3 | Radcal | 10X5-180 | 18999 | 30 Sep 2012 |
| Instrument #4 | | | | |

## SYSTEM INFORMATION

| Manufacturer | Model | Serial No. | Manuf. Date |
|---|---|---|---|
| Rapiscan | 520B | 7041N04 | Apr 2004 |

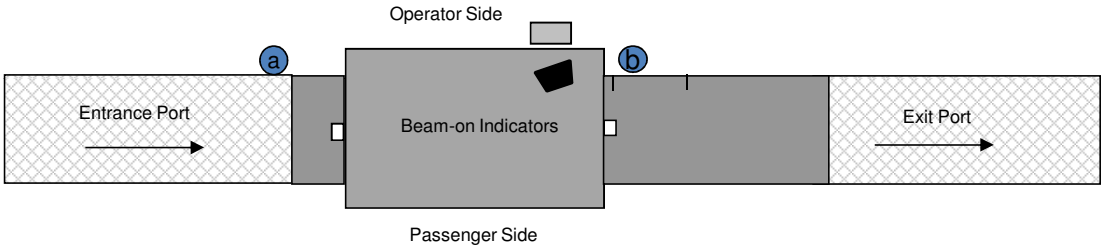
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Certified* | Yes | X | No | | *Place of Manufacture* | Hawthorne, CA | | |
| *Type* | Checkpoint | X | EDS: | In-line | | Stand-Alone | | |
| *Manufacturer Survey Date* | 7 Jul 2011 | | | | | | | |

## VISUAL INSPECTION

| Y | N | Requirement |
|---|---|---|
| X | | Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i)) |
| X | | Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? (21 CFR 1020.40(c)(8)(ii)) |
| X | | Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii)) |
| X | | One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv)) |
| X | | Key Activated Control present? (21 CFR 1020.40(c)(6)(i)) |
| X | | Means to require operator presence at control panel? (21 CFR 1020.40(c)(10)) |
| X | | Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii)) |
| X | | Leaded drapes in good condition? |
| X | | Interlocks not bypassed? |
| | X | Current User's Manual available? (21 CFR 1020.40(c)(9)) |
| X | | Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9)) |

NT=not tested; NA=not applicable.

## SURVEY DIAGRAM




Accessible exterior surfaces scanned with Instruments #5 and #6. All scanning results below action levels? Yes X No (If no, explain below)

## DOSE TO BAGGAGE

| Trial | Exposure ($X_i$) | |
|---|---|---|
| 1 | 214.6 | µR |
| 2 | 210.7 | µR |
| 3 | 207.2 | µR |
| 4 | 206.8 | µR |
| 5 | 211.8 | µR |

| | | |
|---|---|---|
| $X_{avg}$ | 210.2 | µR |
| CV | 0.0155 | |

Coefficient of Variation (CV):

$CV = (1/X_{avg})(\Sigma(X_i - X_{avg})^2/(n-1))^{1/2}$

## EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 µR

| Location | Exposure | | Time | | Exposure in 1 hr | | RESULT |
|---|---|---|---|---|---|---|---|
| a | 6.05 | µR | 5.0 | min | 0.073 | mR | PASS |
| b | 5.01 | µR | 5.0 | min | 0.060 | mR | PASS |
| c | | µR | | min | | mR | |
| d | | µR | | min | | mR | |
| e | | µR | | min | | mR | |

## COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#2 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
User Manual was not available at the time of the survey. The AO believesit is locked inside one of the panel doors.

Additional Instruments Used:

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #5 | Ludlum | Model 3 | 286054 | 27 Sep 2012 |
| Instrument #6 | Ludlum | Model 44-9 | PR306984 | 27 Sep 2012 |

* Instruments #5 and #6 were response checked before and after the survey.

# Survey Worksheet - Cabinet X-Ray Systems

*Health Physics Program*
*U.S. Army Public Health Command*
*Aberdeen Proving Ground, Maryland 21010-5403*

| SURVEY DATA | | SURVEY LOCATION | | | | | |
|---|---|---|---|---|---|---|---|
| Project No. | 26-MF-0FRW-12 | Location | Consolidated Checkpoint, Lane 5 | | | | |
| Survey Date | 25 Jan 2012 | Organization | El Paso Intl Airport | | | | |
| Surveyor(s) | [redacted] | Street Address | 6701 Convair Road | | | | |
| | [redacted] | City/Installation | El Paso | State | Texa | ZIP | 79925 |

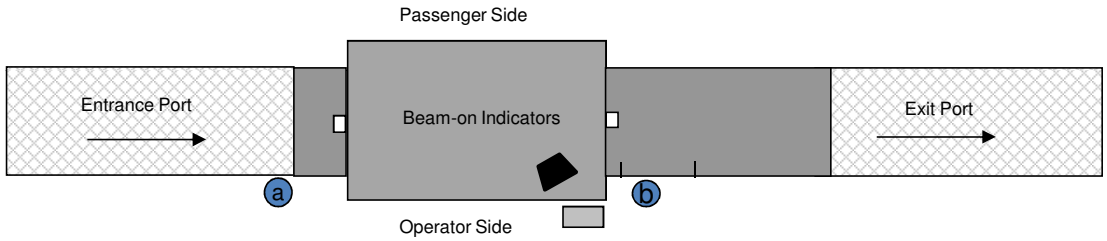
| INSTRUMENTS USED | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #1 | Radcal | 9010 | 90-3378 | 30 Sep 2012 |
| Instrument #2 | Radcal | 10X5-1800 | 17959 | 30 Sep 2012 |
| Instrument #3 | Radcal | 10X5-180 | 18999 | 30 Sep 2012 |
| Instrument #4 | | | | |

| SYSTEM INFORMATION | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Manufacturer | Model | Serial No. | Manuf. Date | | | | | | |
| Rapiscan | Unreadable | Unreadable | Unreadable | | | | | | |
| *Certified* | Yes | X | No | | *Place of Manufacture* | Hawthorne, CA | | | |
| *Type* | Checkpoint | X | EDS: | In-line | | Stand-Alone | | | |
| *Manufacturer Survey Date* | 8 Sep 2011 | | | | | | | | |

## VISUAL INSPECTION

| Y | N | Requirement | Y | N | Requirement |
|---|---|---|---|---|---|
| X | | Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i)) | X | | Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii)) |
| X | | Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? (21 CFR 1020.40(c)(8)(ii)) | X | | Leaded drapes in good condition? |
| X | | Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii)) | X | | Interlocks not bypassed? |
| X | | One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv)) | | X | Current User's Manual available? (21 CFR 1020.40(c)(9)) |
| X | | Key Activated Control present? (21 CFR 1020.40(c)(6)(i)) | X | | Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9)) |
| X | | Means to require operator presence at control panel? (21 CFR 1020.40(c)(10)) | | | NT=not tested; NA=not applicable. |

## SURVEY DIAGRAM




Accessible exterior surfaces scanned with Instruments #5 and #6. All scanning results below action levels? Yes X No (If no, explain below)

## DOSE TO BAGGAGE

| Trial | Exposure ($X_i$) | |
|---|---|---|
| 1 | 218.6 | µR |
| 2 | 228.1 | µR |
| 3 | 233.6 | µR |
| 4 | 219.5 | µR |
| 5 | 220.9 | µR |

| | | |
|---|---|---|
| $X_{avg}$ | 224.1 | µR |
| CV | 0.0289 | |

Coefficient of Variation (CV):

$CV = (1/X_{avg})(\Sigma(X_i - X_{avg})^2/(n-1))^{1/2}$

## EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 µR

| Location | Exposure | | Time | | Exposure in 1 hr | | RESULT |
|---|---|---|---|---|---|---|---|
| a | 3.74 | µR | 5.0 | min | 0.045 | mR | PASS |
| b | 5.17 | µR | 5.0 | min | 0.062 | mR | PASS |
| c | | µR | | min | | mR | |
| d | | µR | | min | | mR | |
| e | | µR | | min | | mR | |

## COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#2 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
User Manual was not available at the time of the survey. The AO believes it is locked inside one of the panel doors.

Additional Instruments Used:

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #5 | Ludlum | Model 3 | 286054 | 27 Sep 2012 |
| Instrument #6 | Ludlum | Model 44-9 | PR306984 | 27 Sep 2012 |

* Instruments #5 and #6 were response checked before and after the survey.

# Survey Worksheet - Cabinet X-Ray Systems

*Health Physics Program*
*U.S. Army Public Health Command*
*Aberdeen Proving Ground, Maryland 21010-5403*

## SURVEY DATA

| | |
|---|---|
| Project No. | 26-MF-0FRW-12 |
| Survey Date | 26 Jan 2012 |
| Surveyor(s) | [redacted] |

## SURVEY LOCATION

| | | | | | |
|---|---|---|---|---|---|
| Location | Southwest Checked Baggage | | | | |
| Organization | El Paso Intl Airport | | | | |
| Street Address | 6701 Convair Road | | | | |
| City/Installation | El Paso | State | Texa | ZIP | 79925 |

## INSTRUMENTS USED

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #1 | Radcal | 9010 | 90-3378 | 30 Sep 2012 |
| Instrument #2 | Radcal | 10X5-1800 | 17959 | 30 Sep 2012 |
| Instrument #3 | Radcal | 10X5-180 | 18999 | 30 Sep 2012 |
| Instrument #4 | | | | |

## SYSTEM INFORMATION

| Manufacturer | Model | Serial No. | Manuf. Date |
|---|---|---|---|
| Reveal | CT-80 DR | 040228 | Sep 2009 |

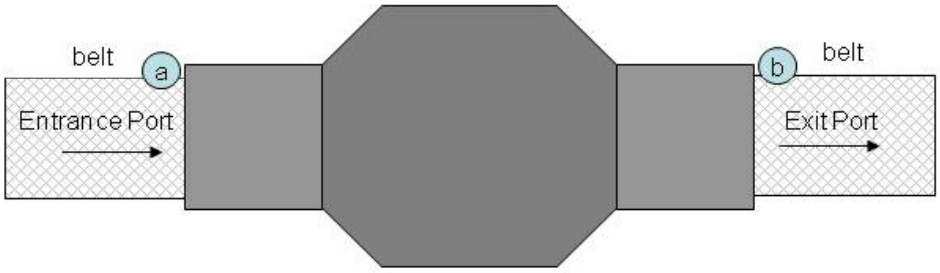
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Certified* | Yes | X | No | | *Place of Manufacture* | Bedford, MA | | |
| *Type* | Checkpoint | | EDS: | In-line | | Stand-Alone | X | |
| *Manufacturer Survey Date* | Not Found | | | | | | | |

## VISUAL INSPECTION

| Y | N | Requirement |
|---|---|---|
| X | | Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i)) |
| X | | Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? (21 CFR 1020.40(c)(8)(ii)) |
| X | | Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii)) |
| X | | One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv)) |
| X | | Key Activated Control present? (21 CFR 1020.40(c)(6)(i)) |
| NA | | Means to require operator presence at control panel? (21 CFR 1020.40(c)(10)) |
| X | | Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii)) |
| X* | | Leaded drapes in good condition? |
| X | | Interlocks not bypassed? |
| X | | Current User's Manual available? (21 CFR 1020.40(c)(9)) |
| | † | Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9)) |

NT=not tested; NA=not applicable.

## SURVEY DIAGRAM




Accessible exterior surfaces scanned with Instruments #5 and #6. All scanning results below action levels? Yes X No (If no, explain below)

## DOSE TO BAGGAGE

| Trial | Exposure ($X_i$) | |
|---|---|---|
| 1 | 30.35 | mR |
| 2 | 24.72 | mR |
| 3 | 28.93 | mR |
| 4 | 30.45 | mR |
| 5 | 26.74 | mR |

| | | |
|---|---|---|
| $X_{avg}$ | 28.2 | mR |
| CV | 0.0876 | |

Coefficient of Variation (CV):

$CV = (1/X_{avg})(\Sigma(X_i - X_{avg})^2/(n-1))^{1/2}$

## EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 µR

| Location | Exposure | | Time | | Exposure in 1 hr | | RESULT |
|---|---|---|---|---|---|---|---|
| a | 0.00 | µR | 5.0 | min | 0.000 | mR | PASS |
| b | 0.22 | µR | 5.0 | min | 0.003 | mR | PASS |
| c | | µR | | min | | mR | |
| d | | µR | | min | | mR | |
| e | | µR | | min | | mR | |

## COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#3 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
* Not all CT-80 curtains were the same thickness. Recommend verifying curtains are the proper thickness.
† Last service provider's survey date not posted on the system.
Additional Instruments Used:

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #5 | Ludlum | Model 3 | 286054 | 27 Sep 2012 |
| Instrument #6 | Ludlum | Model 44-9 | PR306984 | 27 Sep 2012 |

* Instruments #5 and #6 were response checked before and after the survey.

# Survey Worksheet - Cabinet X-Ray Systems

*Health Physics Program*
*U.S. Army Public Health Command*
*Aberdeen Proving Ground, Maryland 21010-5403*

## SURVEY DATA

| | |
|---|---|
| Project No. | 26-MF-0FRW-12 |
| Survey Date | 26 Jan 2012 |
| Surveyor(s) | [redacted] |

## SURVEY LOCATION

| | | | | | |
|---|---|---|---|---|---|
| Location | American Airlines Checked Baggage | | | | |
| Organization | El Paso Intl Airport | | | | |
| Street Address | 6701 Convair Road | | | | |
| City/Installation | El Paso | State | Texa | ZIP | 79925 |

## INSTRUMENTS USED

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #1 | Radcal | 9010 | 90-3378 | 30 Sep 2012 |
| Instrument #2 | Radcal | 10X5-1800 | 17959 | 30 Sep 2012 |
| Instrument #3 | Radcal | 10X5-180 | 18999 | 30 Sep 2012 |
| Instrument #4 | | | | |

## SYSTEM INFORMATION

| Manufacturer | Model | Serial No. | Manuf. Date |
|---|---|---|---|
| Reveal | CT-80 DR | 040576 | May 2009 |

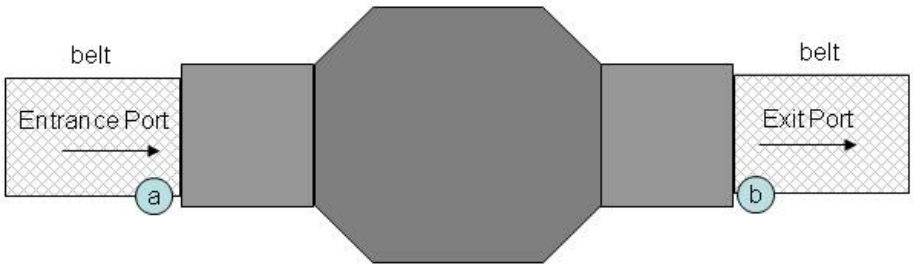
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Certified* | Yes | X | No | | *Place of Manufacture* | Bedford, MA | | |
| *Type* | Checkpoint | | EDS: | In-line | | Stand-Alone | X | |
| *Manufacturer Survey Date* | Not Found | | | | | | | |

## VISUAL INSPECTION

| Y | N | Requirement |
|---|---|---|
| X | | Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i)) |
| X | | Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? (21 CFR 1020.40(c)(8)(ii)) |
| X | | Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii)) |
| X | | One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv)) |
| X | | Key Activated Control present? (21 CFR 1020.40(c)(6)(i)) |
| NA | | Means to require operator presence at control panel? (21 CFR 1020.40(c)(10)) |
| X | | Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii)) |
| X* | | Leaded drapes in good condition? |
| X | | Interlocks not bypassed? |
| X | | Current User's Manual available? (21 CFR 1020.40(c)(9)) |
| | † | Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9)) |

NT=not tested; NA=not applicable.

## SURVEY DIAGRAM




Accessible exterior surfaces scanned with Instruments #5 and #6. All scanning results below action levels? Yes X No (If no, explain below)

## DOSE TO BAGGAGE

| Trial | Exposure ($X_i$) | |
|---|---|---|
| 1 | 24.84 | mR |
| 2 | 25.08 | mR |
| 3 | 24.64 | mR |
| 4 | 24.71 | mR |
| 5 | 29.49 | mR |

| | | |
|---|---|---|
| $X_{avg}$ | 25.8 | mR |
| CV | 0.0814 | |

Coefficient of Variation (CV):

$$CV = (1/X_{avg})(\Sigma(X_i - X_{avg})^2/(n-1))^{1/2}$$

## EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 µR

| Location | Exposure | | Time | | Exposure in 1 hr | | RESULT |
|---|---|---|---|---|---|---|---|
| a | 19.23 | µR | 5.0 | min | 0.231 | mR | PASS |
| b | 1.03 | µR | 5.0 | min | 0.012 | mR | PASS |
| c | | µR | | min | | mR | |
| d | | µR | | min | | mR | |
| e | | µR | | min | | mR | |

## COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#3 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
* Not all CT-80 curtains were the same thickness. Recommend verifying curtains are the proper thickness.
† Last service provider's survey date not posted on the system.
Additional Instruments Used:

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #5 | Ludlum | Model 3 | 286054 | 27 Sep 2012 |
| Instrument #6 | Ludlum | Model 44-9 | PR306984 | 27 Sep 2012 |

* Instruments #5 and #6 were response checked before and after the survey.

# Survey Worksheet - Cabinet X-Ray Systems

*Health Physics Program*
*U.S. Army Public Health Command*
*Aberdeen Proving Ground, Maryland 21010-5403*

## SURVEY DATA

| | |
|---|---|
| Project No. | 26-MF-0FRW-12 |
| Survey Date | 26 Jan 2012 |
| Surveyor(s) | [redacted] |

## SURVEY LOCATION

| | | | | | |
|---|---|---|---|---|---|
| Location | US Airways Checked Baggage | | | | |
| Organization | El Paso Intl Airport | | | | |
| Street Address | 6701 Convair Road | | | | |
| City/Installation | El Paso | State | Texa | ZIP | 79925 |

## INSTRUMENTS USED

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #1 | Radcal | 9010 | 90-3378 | 30 Sep 2012 |
| Instrument #2 | Radcal | 10X5-1800 | 17959 | 30 Sep 2012 |
| Instrument #3 | Radcal | 10X5-180 | 18999 | 30 Sep 2012 |
| Instrument #4 | | | | |

## SYSTEM INFORMATION

| Manufacturer | Model | Serial No. | Manuf. Date |
|---|---|---|---|
| Reveal | CT-80 DR | 040691 | Jan 2010 |

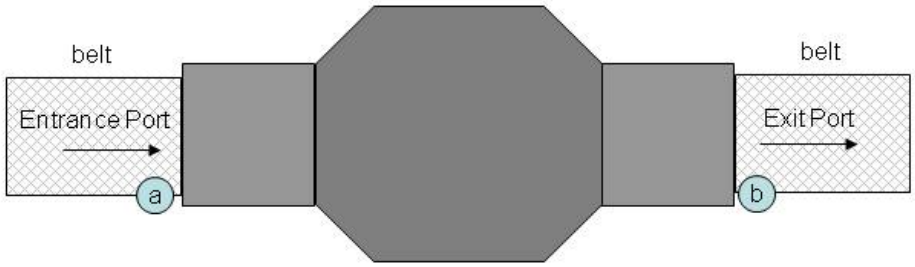
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Certified* | Yes | X | No | | *Place of Manufacture* | Bedford, MA | | |
| *Type* | Checkpoint | | EDS: | In-line | | Stand-Alone | X | |
| *Manufacturer Survey Date* | Not Found | | | | | | | |

## VISUAL INSPECTION

| Y | N | Requirement |
|---|---|---|
| X | | Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i)) |
| X | | Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? (21 CFR 1020.40(c)(8)(ii)) |
| X | | Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii)) |
| X | | One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv)) |
| X | | Key Activated Control present? (21 CFR 1020.40(c)(6)(i)) |
| NA | | Means to require operator presence at control panel? (21 CFR 1020.40(c)(10)) |
| X | | Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii)) |
| X* | | Leaded drapes in good condition? |
| X | | Interlocks not bypassed? |
| X | | Current User's Manual available? (21 CFR 1020.40(c)(9)) |
| | † | Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9)) |

NT=not tested; NA=not applicable.

## SURVEY DIAGRAM




Accessible exterior surfaces scanned with Instruments #5 and #6. All scanning results below action levels? Yes X No (If no, explain below)

## DOSE TO BAGGAGE

| Trial | Exposure ($X_i$) | |
|---|---|---|
| 1 | 25.40 | mR |
| 2 | 25.31 | mR |
| 3 | 25.34 | mR |
| 4 | 25.18 | mR |
| 5 | 25.21 | mR |

| | | |
|---|---|---|
| $X_{avg}$ | 25.3 | mR |
| CV | 0.0036 | |

Coefficient of Variation (CV):

$CV = (1/X_{avg})(\Sigma(X_i - X_{avg})^2/(n-1))^{1/2}$

## EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 µR

| Location | Exposure | | Time | | Exposure in 1 hr | | RESULT |
|---|---|---|---|---|---|---|---|
| a | 22.04 | µR | 5.0 | min | 0.264 | mR | PASS |
| b | 34.03 | µR | 5.0 | min | 0.408 | mR | PASS |
| c | | µR | | min | | mR | |
| d | | µR | | min | | mR | |
| e | | µR | | min | | mR | |

## COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#3 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
* Not all CT-80 curtains were the same thickness. Recommend verifying curtains are the proper thickness.
† Last service provider's survey date not posted on the system.
Additional Instruments Used:

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #5 | Ludlum | Model 3 | 286054 | 27 Sep 2012 |
| Instrument #6 | Ludlum | Model 44-9 | PR306984 | 27 Sep 2012 |

* Instruments #5 and #6 were response checked before and after the survey.

# Survey Worksheet - Cabinet X-Ray Systems

*Health Physics Program*
*U.S. Army Public Health Command*
*Aberdeen Proving Ground, Maryland 21010-5403*

## SURVEY DATA

| | |
|---|---|
| Project No. | 26-MF-0FRW-12 |
| Survey Date | 26 Jan 2012 |
| Surveyor(s) | [redacted] |

## SURVEY LOCATION

| | | | | | |
|---|---|---|---|---|---|
| Location | United Airlines Checked Baggage | | | | |
| Organization | El Paso Intl Airport | | | | |
| Street Address | 6701 Convair Road | | | | |
| City/Installation | El Paso | State | Texa | ZIP | 79925 |

## INSTRUMENTS USED

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #1 | Radcal | 9010 | 90-3378 | 30 Sep 2012 |
| Instrument #2 | Radcal | 10X5-1800 | 17959 | 30 Sep 2012 |
| Instrument #3 | Radcal | 10X5-180 | 18999 | 30 Sep 2012 |
| Instrument #4 | | | | |

## SYSTEM INFORMATION

| Manufacturer | Model | Serial No. | Manuf. Date |
|---|---|---|---|
| Reveal | CT-80 DR | 040685 | Jan 2010 |

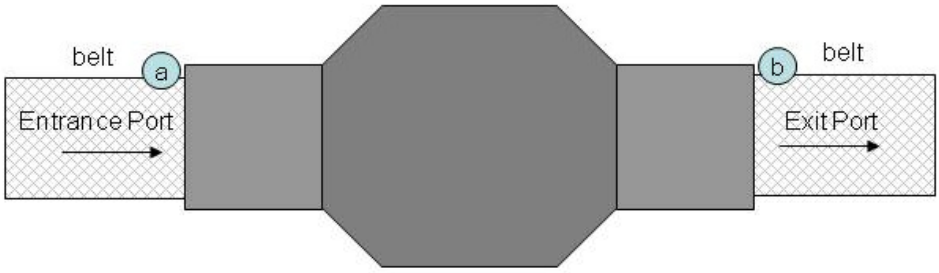
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Certified* | Yes | X | No | | *Place of Manufacture* | Bedford, MA | | |
| *Type* | Checkpoint | | EDS: | In-line | | Stand-Alone | X | |
| *Manufacturer Survey Date* | Not Found | | | | | | | |

## VISUAL INSPECTION

| Y | N | Requirement |
|---|---|---|
| X | | Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i)) |
| X | | Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? (21 CFR 1020.40(c)(8)(ii)) |
| X | | Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii)) |
| X | | One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv)) |
| X | | Key Activated Control present? (21 CFR 1020.40(c)(6)(i)) |
| NA | | Means to require operator presence at control panel? (21 CFR 1020.40(c)(10)) |
| X | | Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii)) |
| X* | | Leaded drapes in good condition? |
| X | | Interlocks not bypassed? |
| X | | Current User's Manual available? (21 CFR 1020.40(c)(9)) |
| | † | Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9)) |

NT=not tested; NA=not applicable.

## SURVEY DIAGRAM




Accessible exterior surfaces scanned with Instruments #5 and #6. All scanning results below action levels? Yes X No (If no, explain below)

## DOSE TO BAGGAGE

| Trial | Exposure ($X_i$) | |
|---|---|---|
| 1 | 24.39 | mR |
| 2 | 26.14 | mR |
| 3 | 23.95 | mR |
| 4 | 28.04 | mR |
| 5 | 23.60 | mR |

| | | |
|---|---|---|
| $X_{avg}$ | 25.2 | mR |
| CV | 0.0734 | |

Coefficient of Variation (CV):

$$CV = (1/X_{avg})(\Sigma(X_i - X_{avg})^2/(n-1))^{1/2}$$

## EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 µR

| Location | Exposure | | Time | | Exposure in 1 hr | | RESULT |
|---|---|---|---|---|---|---|---|
| a | 6.91 | µR | 5.0 | min | 0.083 | mR | PASS |
| b | 1.60 | µR | 5.0 | min | 0.019 | mR | PASS |
| c | | µR | | min | | mR | |
| d | | µR | | min | | mR | |
| e | | µR | | min | | mR | |

## COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#3 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
* Not all CT-80 curtains were the same thickness. Recommend verifying curtains are the proper thickness.
† Last service provider's survey date not posted on the system.
Additional Instruments Used:

| | Manufacturer | Model | Serial No. | Cal. Due |
|---|---|---|---|---|
| Instrument #5 | Ludlum | Model 3 | 286054 | 27 Sep 2012 |
| Instrument #6 | Ludlum | Model 44-9 | PR306984 | 27 Sep 2012 |

* Instruments #5 and #6 were response checked before and after the survey.

Survey Notes Provided on 26 January 2012

**Encl 3**

MCHB-IP-OHP 26 January 2012

Exit Briefing Notes

1. Project Information.

a. Radiation Protection Survey No. 26-MF-0FRW-12

b. Survey dates: 25-26 January 2012

c. El Paso International Airport (ELP), El Paso, Texas

d. Survey Officer(s): [redacted], Certified Health Physicist and [redacted], Health Physicist

2. Background Information.

a. TSA Headquarters Contact: Jill Segraves, Director, Occupational Safety, Health, and Environment (OSHE), phone [redacted], e-mail: [redacted].

b. Airport Contact: Ms. Susan D. Deemer, Administrative Officer, Phone: (O) [redacted] and/or (C) [redacted]

c. Individuals Assisting the Survey Team:

| Name | Title/Position |
|---|---|
| [redacted] | Health Physicist / TSA HQ |
| [redacted] | TSM-S |
| [redacted] | TSM |
| [redacted] | Lead TSO |
| [redacted] | Supervisor |
| [redacted] | Lead TSO |

d. AIT (Backscatter X-Ray) System Surveyed:

| Model | Serial No. | Location |
|---|---|---|
| Rapiscan Secure 1000 SP | S51005007 | Consolidated Checkpoint Lane 1 |
| Rapiscan Secure 1000 SP | S51005008 | Consolidated Checkpoint Lane 2 |
| Rapiscan Secure 1000 SP | S51005010 | Consolidated Checkpoint Lane 3 |

e. Cabinet X-Ray Systems Surveyed:

| Model | Serial No. | Location |
|---|---|---|
| Rapiscan 520B | 7033306 | Consolidated Checkpoint Lane 3 |
| Rapiscan 520B | 7041704 | Consolidated Checkpoint Lane 4 |
| Rapiscan 522B | 7013205 | Consolidated Checkpoint Lane 5 |

| | | |
|---|---|---|
| Reveal CT-80 DR | 040576 | American Airlines Checked Baggage |
| Reveal CT-80 DR | 040228 | Southwest Airlines Checked Baggage |
| Reveal CT-80 DR | 040691 | U.S. Airways Checked Baggage |
| Reveal CT-80 DR | 040685 | United Airlines Checked Baggage |

f. Cabinet X-Ray Systems Not Surveyed: The following were inoperable at the time of the survey:

| Model | Serial No. | Location |
|---|---|---|
| Rapiscan 520B | 7021105 | Consolidated Checkpoint Lane 1 |
| Rapiscan 520B | 7021106 | Consolidated Checkpoint Lane 2 |

3. Findings and Recommendations.

a. AIT (Backscatter X-Ray) Systems.

(1) The x-ray personnel screening systems surveyed (2.d) were found to be in compliance with the radiation dose limits of American National Standards Institute/Health Physics Society (ANSI/HPS) Standard N43.17-2009, Radiation Safety for Personnel Security Screening Systems Using X-Ray or Gamma Radiation.

(2) The systems surveyed were found to be in compliance with the other requirements of ANSI/HPS N43.17-2009, with the following exception: A user's manual was not available at the time of the survey. The manuals were provided at the conclusion of the exit brief. They currently are stored in the SSI cabinet that is not located were the AIT's operate.

b. Cabinet X-ray Systems.

(1) All systems surveyed (2.e) were found to be in compliance with the radiation emission limits of Title 21, Code of Federal Regulations, Section 1020.40.

(2) All systems were found to be in compliance with the other requirements of Title 21, Code of Federal Regulations, Section 1020.40, with the following exceptions:

(a) At the time of the survey, user's manuals were not available for the Rapiscan Models 520B and 522B. It was determined the manuals are stored in a locked door of each system that makes it unavailable to the operator, if needed.

(b) Rapiscan 520B, Label unreadable, Consolidated Checkpoint, Lane 1: The model number, serial number, and the date of manufacture were unreadable on the system label.

(c) Rapiscan 522B, Label unreadable, Consolidated Checkpoint, Lane 5: The model number, serial number, and the date of manufacture were unreadable on the system label.

(d) Rapiscan 520B, Label discrepancy, Consolidated Checkpoint, Lane 4: The serial number provided as TSA ELP inventory had this machine as SN: 7041704 and the system label identified it as SN: 7041N04. The AO will follow-up on the discrepancy to determine the correct serial number.

(e) Rapiscan 520B, SN 7033306, Consolidated Checkpoint, Lane 3: The lead drapes at entrance and exit ports are starting to show wear.

(f) Reveal CT-80 DR, SN 040576, American Airlines Checked Baggage: Based on ambient exposure rate measurements, entry side curtains appear to have sufficient wear to justify additional inspection by manufacturer. Replacement is recommended. All measurements were below the 0.5 mR in 1-hour standard.

(3) The following items were also noted during the surveys:

(a) A service provider survey date was not posted on any of the Reveal CT-80 DR systems.

(b) For the Reveal CT-80 DRs, it is recommended that the condition of all curtains be inspected and verified to meet the manufacturer specifications.

c. In addition, the survey officers noted the following administrative items during the surveys:

(1) Rapiscan Secure 1000 SP, SN: S51005007, Lane 1: The slave unit made unusually loud idle and travel noises. Request that the service provider check during next visit.

(2) Rapsican Secure 1000 SP, SN: S51005008, Lane 2: The master unit and the slave unit were misaligned with one another. This caused an increase in scatter radiation at the exit point on the slave unit side and on the entrance point on the master unit side. Request that the service provider realign during next visit.

(3) Rapiscan Secure 1000 SP, SN: S51005007, Lane 1: The master unit access door was found to be in an unlocked condition. The door was locked at the conclusion of the exit brief.

(4) Rapiscan Secure 1000 SP, SN: S51005008, Lane 2: The master unit access door was found to be in an unlocked condition. The door was locked at the conclusion of the exit brief.

(5) Rapiscan Secure 1000 SP, SN: S51005010, Lane 3: The master unit access door was found to be in an unlocked condition. The door was locked at the conclusion of the exit brief.

d. Based on dosimetry and field measurements around the Secure 1000 SP and cabinet x-ray systems, it is estimated that TSOs will receive a radiation dose of less than 10 millirem in a year. For comparison, the occupational limit under Occupational Safety and Health Administration regulations is 1,250 millirem per quarter (5,000 millirem per year) and the goal of the TSA radiation safety program is to keep all radiation doses less than 100 millirem per year.