



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

15 AUG 2011

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 FLL Radiation Safety Surveys, 27 June 2011; 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 July 18-19, 2011 at Fort Lauderdale-Hollywood International Airport (FLL), Fort Lauderdale, FL, Project No. 26-MF-0EVU-11. 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 a cabinet x-ray system 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], Certified Health Physicist (CHP), Health Physics Program (HPP), Army Institute of Public Health (AIPH); [REDACTED], Research Analyst, HPP, AIPH; [REDACTED], CHP, Consolidated Safety Services (CSS); and [REDACTED], Safety Specialist, CSS. A total of nine AIT x-ray systems were evaluated for compliance with the requirements of ANSI/HPS N43.17-2009 and one cabinet x-ray system was evaluated for compliance with the requirements of Title 21, CFR, Subchapter J. The survey results for the AIT systems are provided in Enclosure 1 and the survey results for the cabinet system is provided in Enclosure 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. The cabinet x-ray system tested was found to be in compliance with the emissions limit specified in Title 21, CFR, Subchapter J. There is no health hazard 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, with the exception of the warning label "Caution: X-Rays Produced when Energized" which was not present at the location where scans can be initiated for all Rapiscan Secure 1000 SP systems. The label was posted on the systems, however, it was not posted at the location where scans can be initiated.

The cabinet x-ray system surveyed was found to be in compliance with the other requirements of Title 21, CFR, Section 1020.40, with the exception of the warning label "Caution: Do Not Insert Any Part of the Body When System is Energized – X-Ray Hazard" which was not present at the exit port.

In addition, the survey officers noted the following administrative item during the surveys: The following AIT systems were making louder than normal mechanical sounds. The cause of the mechanical sounds should be checked by the maintenance service provider during their next visit.

Location	Serial No.	Description
Terminal 2, Checkpoint D, Lane 3/4	S51003010	Slave side - loud idle noise.
Terminal 3, Checkpoint F, Lane 1/2	S51003005	Slave side - loud idle noise. Master side – squeaking during travel.
Terminal 4, Checkpoint H, Lane 3/4	S51007009	Master and slave side - loud idle noises.

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. Tim Lewis, Federal Security Director (FSD); Ms. Myriam Berio, Assistant FSD for Screening; and four other TSA FLL staff on 20 July 2011. A copy of the survey notes is provided in Enclosure 3.

For more information concerning the survey, please contact the AIPH, HPP, at [REDACTED].

Sincerely,

[REDACTED]
[REDACTED], CIH
Portfolio Director
Occupational Health Sciences

Enclosures

Survey Results for Nine AIT X-Ray Systems

Survey Worksheet - AIT 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-0EVU-11			Location	Terminal 1, Checkpoint C, Lane 1		
Survey Date	18 Jul 2011			Organization	Fort Lauderdale-Hollywood International		
Surveyor(s)	[REDACTED]			Street Address	320 Terminal Drive		
				City/Installation	Fort Lauderdale	State	FL

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3290	17 Mar 2012	Rapiscan	Secure 1000SP	S51003007	Jan. 2010
Instrument #2	Radcal	10X5-1800	10302	17 Mar 2012	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	WB Johnson	TVX-2000	40155	Resp Chkd*	Service Provider Survey Date	1 Jun 2011		

VISUAL INSPECTION			
Y	N	Requirement	Requirement
X		Key activated control with key capture? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.c)	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? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.d)**	X-ray emission terminates after a preset time or exposure? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.e)
X		Technique factors preset for each mode of operation? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.b)	Operators have a clear view of the scanning area? (21 CFR 1020.31(j); 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)	Tool or key required to open or remove access panels? (21 CFR 1020.31(j); 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)	User provided with required information? (21 CFR 1020.31(j); 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																									
<p style="text-align: center;">Inspection Zone Boundary</p>	Scanning below action levels? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in comments)																									
	Inspection zone boundary scanned with Instrument #3.																									
SCATTERED RADIATION (Optional)†																										
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	†Measurements not performed because passengers were not being screened with this system when the survey team was present.																									

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Additional instruments used:

	Manufacturer	Model	Serial No.	Cal. Due
Instrument #4	Radcal	9010	90-3315	30 Jul 2011
Instrument #5	Radcal	10X5-1800	13115	20 May 2012

Survey Worksheet - AIT X-Ray Systems

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Survey Worksheet - AIT X-Ray Systems

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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? (21 CFR 1020.31(j); 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in comments)																									
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DOSE PER SCREENING				BEAM QUALITY																																																																			
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Reference Effective Dose per Screening (max 25 μrem): 1.92 μrem or 0.019 μSv				HVL "Front" Side: 1.1 mm Al HVL "Back" Side: 1.2 mm Al Conversion Factor: 0.133 Min. Filtration ¹ : 1.0 mm Al <small>¹ An HVL of 1 mm Al corresponds to a filtration of 1 mm Al for this system</small>																																																																			
Energy Correction Factor: 1.25 RESULT: PASS				RESULT: PASS																																																																			
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COMMENTS AND RECOMMENDATIONS

*Instrument was response checked before and after surveys.
 **The label was posted on the system; however, it was not posted at the location where scans can be initiated.

Additional instruments used:

	Manufacturer	Model	Serial No.	Cal. Due
Instrument #4	Radcal	9010	90-3315	30 Jul 2011
Instrument #5	Radcal	10X5-1800	13115	20 May 2012

Survey Worksheet - AIT 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-0EVU-11			Location	Terminal 2, Checkpoint D, Lane(s) 3/4		
Survey Date	19 Jul 2011			Organization	Fort Lauderdale-Hollywood International		
Surveyor(s)	[REDACTED]			Street Address	320 Terminal Drive		
	[REDACTED]			City/Installation	Fort Lauderdale	State	FL ZIP 33315

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3290	17 Mar 2012	Rapiscan	Secure 1000SP	S51003010	Jan. 2010
Instrument #2	Radcal	10X5-1800	10302	17 Mar 2012	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	WB Johnson	TVX-2000	40155	Resp Chkd*	Service Provider Survey Date	14 Jun 2011		

VISUAL INSPECTION			
Y	N	Requirement	Requirement
X		Key activated control with key capture? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.c)	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? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.d)**	X-ray emission terminates after a preset time or exposure? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.e)
X		Technique factors preset for each mode of operation? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.b)	Operators have a clear view of the scanning area? (21 CFR 1020.31(j); 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)	Tool or key required to open or remove access panels? (21 CFR 1020.31(j); 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)	User provided with required information? (21 CFR 1020.31(j); 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																									
<p style="text-align: center;">Inspection Zone Boundary</p>	Scanning below action levels? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in comments)																									
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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	0.07 μR	0.02 μR																						
3	0.00 μR	0.00 μR	0.00 μR	0.00 μR																						
4	0.00 μR	0.07 μR	0.07 μR	0.05 μR																						
	Additional measurements between locations 1&2 and 3&4 = 0.00 μR Measurements made with Instruments #1 & #2																									

DOSE PER SCREENING				BEAM QUALITY			
		Exposure (X)				Exposure (X)	
Trial	"Front" Side	"Back" Side		mm Al	"Front" Side	"Back" Side	
a	5.49 μR	5.50 μR	Reference Effective Dose per Screening (max 25 μrem): 1.80 μrem or 0.018 μSv	0	2.27 μR	1.86 μR	HVL "Front" Side 1.2 mm Al
b	5.49 μR	5.43 μR		0	2.21 μR	1.93 μR	HVL "Back" Side 1.1 mm Al
c	5.57 μR	5.37 μR		1	1.24 μR	1.03 μR	Conversion Factor 0.131
d	5.43 μR	5.43 μR		1	1.17 μR	0.96 μR	Min. Filtration ¹ 1.0 mm Al
e	5.56 μR	5.37 μR		1.5	0.96 μR	0.69 μR	¹ An HVL of 1 mm Al corresponds to a filtration of 1 mm Al for this system
AVG	5.51 μR	5.42 μR	1.5	1.03 μR	0.83 μR		
Energy Correction Factor	1.25						
Measurements made with Instruments #1 & #2 RESULT PASS				Measurements made with Instruments #4 & #5 RESULT PASS			

COMMENTS AND RECOMMENDATIONS

*Instrument was response checked before and after surveys.
 **The label was posted on the system; however, it was not posted at the location where scans can be initiated.
 Slave ("Back") unit making an unusually loud idle noise.
 Additional instruments used:

	Manufacturer	Model	Serial No.	Cal. Due
Instrument #4	Radcal	9010	90-3315	30 Jul 2011
Instrument #5	Radcal	10X5-1800	13115	20 May 2012

Survey Worksheet - AIT 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-0EVU-11			Location	Terminal 3, Checkpoint E, Lane 4		
Survey Date	19 Jul 2011			Organization	Fort Lauderdale-Hollywood International		
Surveyor(s)	[REDACTED]			Street Address	320 Terminal Drive		
				City/Installation	Fort Lauderdale	State	FL ZIP 33315

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3290	17 Mar 2012	Rapiscan	Secure 1000SP	S51003004	Jan. 2010
Instrument #2	Radcal	10X5-1800	10302	17 Mar 2012	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	WB Johnson	TVX-2000	40155	Resp Chkd*	Service Provider Survey Date	17 May 2011		

VISUAL INSPECTION			
Y	N	Requirement	Requirement
X		Key activated control with key capture? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.c)	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? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.d)**	X-ray emission terminates after a preset time or exposure? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.e)
X		Technique factors preset for each mode of operation? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.b)	Operators have a clear view of the scanning area? (21 CFR 1020.31(j); 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)	Tool or key required to open or remove access panels? (21 CFR 1020.31(j); 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)	User provided with required information? (21 CFR 1020.31(j); 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																									
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COMMENTS AND RECOMMENDATIONS

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Additional instruments used:

	Manufacturer	Model	Serial No.	Cal. Due
Instrument #4	Radcal	9010	90-3315	30 Jul 2011
Instrument #5	Radcal	10X5-1800	13115	20 May 2012

Survey Worksheet - AIT 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-0EVU-11			Location	Terminal 3, Checkpoint F, Lane(s) 1/2		
Survey Date	19 Jul 2011			Organization	Fort Lauderdale-Hollywood International		
Surveyor(s)	[REDACTED]			Street Address	320 Terminal Drive		
	[REDACTED]			City/Installation	Fort Lauderdale	State	FL ZIP 33315

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3290	17 Mar 2012	Rapiscan	Secure 1000SP	S51003005	Jan. 2010
Instrument #2	Radcal	10X5-1800	10302	17 Mar 2012	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	WB Johnson	TVX-2000	40155	Resp Chkd*	Service Provider Survey Date	27 May 2011		

VISUAL INSPECTION			
Y	N	Requirement	Requirement
X		Key activated control with key capture? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.c)	At least one lighted scan in progress indicator visible from the inspection zone? (ANSI N43.17-2009, paragraph 7.2.1.b)
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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																									
<p style="text-align: center;">Inspection Zone Boundary</p>	Scanning below action levels? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in comments)																									
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SCATTERED RADIATION (Optional)																										
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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																						
	Additional measurements between locations 1&2 and 3&4 = 0.00 μR Measurements made with Instruments #1 & #2																									

DOSE PER SCREENING				BEAM QUALITY			
Exposure (X)				Exposure (X)			
Trial	"Front" Side	"Back" Side	Reference Effective Dose per Screening (max 25 μrem):	mm Al	"Front" Side	"Back" Side	HVL "Front" Side
a	5.96 μR	5.84 μR	1.77 μrem or 0.018 μSv	0	1.46 μR	1.88 μR	1.1 mm Al
b	5.96 μR	5.91 μR		0	1.46 μR	1.95 μR	1.1 mm Al
c	5.91 μR	5.85 μR		1	0.76 μR	1.04 μR	Conversion Factor
d	5.91 μR	5.86 μR		1	0.76 μR	0.97 μR	Min. Filtration ¹
e	5.91 μR	5.79 μR		1.5	0.62 μR	0.76 μR	1.0 mm Al
AVG	5.93 μR	5.85 μR	1.5	0.53 μR	0.76 μR		
Energy Correction Factor	1.25			¹ An HVL of 1 mm Al corresponds to a filtration of 1 mm Al for this system			
Measurements made with Instruments #1 & #2 RESULT PASS				Measurements made with Instruments #4 & #5 RESULT PASS			

COMMENTS AND RECOMMENDATIONS

*Instrument was response checked before and after surveys.
 **The label was posted on the system; however, it was not posted at the location where scans can be initiated.
 Slave ("Back") unit making an unusually loud idle noise. Master ("Front") unit making squeaking noises during travel.
 Additional instruments used:

	Manufacturer	Model	Serial No.	Cal. Due
Instrument #4	Radcal	9010	90-3315	30 Jul 2011
Instrument #5	Radcal	10X5-1800	13115	20 May 2012

Survey Worksheet - AIT 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-0EVU-11			Location	Terminal 3, Checkpoint F, Lane 3		
Survey Date	19 Jul 2011			Organization	Fort Lauderdale-Hollywood International		
Surveyor(s)	[REDACTED]			Street Address	320 Terminal Drive		
	[REDACTED]			City/Installation	Fort Lauderdale	State	FL ZIP 33315

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3290	17 Mar 2012	Rapiscan	Secure 1000SP	S51003006	Jan. 2010
Instrument #2	Radcal	10X5-1800	10302	17 Mar 2012	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	WB Johnson	TVX-2000	40155	Resp Chkd*	Service Provider Survey Date	27 May 2011		

VISUAL INSPECTION					
Y	N	Requirement	Y	N	Requirement
X		Key activated control with key capture? (21 CFR 1020.31(j); 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? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.d)**	X		X-ray emission terminates after a preset time or exposure? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.e)
X		Technique factors preset for each mode of operation? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.b)	X		Operators have a clear view of the scanning area? (21 CFR 1020.31(j); 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? (21 CFR 1020.31(j); 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? (21 CFR 1020.31(j); 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in comments)																									
	Inspection zone boundary scanned with Instrument #3.																									
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Location	Scan 1	Scan 2	Scan 3	Average																						
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	†Measurements not performed because passengers were not being screened with this system when the survey team was present.																									

DOSE PER SCREENING					BEAM QUALITY																																												
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Measurements made with Instruments #1 & #2 RESULT PASS					Measurements made with Instruments #4 & #5 HVL "Front" Side 1.0 mm Al HVL "Back" Side 1.1 mm Al Conversion Factor 0.120 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																																												

COMMENTS AND RECOMMENDATIONS

*Instrument was response checked before and after surveys.
 **The label was posted on the system; however, it was not posted at the location where scans can be initiated.

Additional instruments used:

	Manufacturer	Model	Serial No.	Cal. Due
Instrument #4	Radcal	9010	90-3315	30 Jul 2011
Instrument #5	Radcal	10X5-1800	13115	20 May 2012

Survey Worksheet - AIT 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-0EVU-11			Location	Terminal 4, Checkpoint H, Lane(s) 3/4		
Survey Date	19 Jul 2011			Organization	Fort Lauderdale-Hollywood International		
Surveyor(s)	[REDACTED]			Street Address	320 Terminal Drive		
	[REDACTED]			City/Installation	Fort Lauderdale	State	FL ZIP 33315

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3290	17 Mar 2012	Rapiscan	Secure 1000SP	S51003011	Jan. 2010
Instrument #2	Radcal	10X5-1800	10302	17 Mar 2012	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	WB Johnson	TVX-2000	40155	Resp Chkd*	Service Provider Survey Date	16 Jun 2011		

VISUAL INSPECTION			
Y	N	Requirement	Y N
X		Key activated control with key capture? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.c)	X
	X	"Caution: X-Rays Produced When Energized" label present at control to initiate scan? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.d)**	X
X		Technique factors preset for each mode of operation? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.b)	X
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
X		Means to terminate emission of radiation other than an interlock? (ANSI N43.17-2009, paragraph 7.2.1.e)	X
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 <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain in comments)			
	Inspection zone boundary scanned with Instrument #3.			
SCATTERED RADIATION (Optional)†				
Location	Scan 1	Scan 2	Scan 3	Average
1	μR	μR	μR	μR
2	μR	μR	μR	μR
3	μR	μR	μR	μR
4	μR	μR	μR	μR
†Measurements not performed because passengers were not being screened with this system when the survey team was present.				

DOSE PER SCREENING					BEAM QUALITY																																												
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COMMENTS AND RECOMMENDATIONS

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 Master ("Front") and Slave ("Back") units making unusually loud idle noises.
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Survey Worksheet - AIT 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-0EVU-11			Location	Terminal 4, Checkpoint H, Lane(s) 5/6		
Survey Date	19 Jul 2011			Organization	Fort Lauderdale-Hollywood International		
Surveyor(s)	[REDACTED]			Street Address	320 Terminal Drive		
				City/Installation	Fort Lauderdale	State	FL ZIP 33315

INSTRUMENTS USED					SYSTEM INFORMATION			
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Instrument #1	Radcal	9010	90-3290	17 Mar 2012	Rapiscan	Secure 1000SP	S51003012	Jan. 2010
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Instrument #3	WB Johnson	TVX-2000	40155	Resp Chkd*	Service Provider Survey Date	16 Jun 2011		

VISUAL INSPECTION			
Y	N	Requirement	Requirement
X		Key activated control with key capture? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.c)	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? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.d)**	X-ray emission terminates after a preset time or exposure? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.e)
X		Technique factors preset for each mode of operation? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.b)	Operators have a clear view of the scanning area? (21 CFR 1020.31(j); 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)	Tool or key required to open or remove access panels? (21 CFR 1020.31(j); 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)	User provided with required information? (21 CFR 1020.31(j); 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)	

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SURVEY DIAGRAM	SCANNING MEASUREMENTS																									
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COMMENTS AND RECOMMENDATIONS

*Instrument was response checked before and after surveys.
 **The label was posted on the system; however, it was not posted at the location where scans can be initiated.

Additional instruments used:

	Manufacturer	Model	Serial No.	Cal. Due
Instrument #4	Radcal	9010	90-3315	30 Jul 2011
Instrument #5	Radcal	10X5-1800	13115	20 May 2012

Survey Results for One Cabinet X-Ray System

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-0EVU-11				Location	Terminal 2, Checkpoint D, Lane 1			
Survey Date	19 Jul 2011				Organization	Fort Lauderdale-Hollywood International			
Surveyor(s)	[REDACTED]				Street Address	320 Terminal Drive			
					City/Installation	Fort Lauderdale	State	FL	ZIP
INSTRUMENTS USED					SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date	
Instrument #1	Radcal	9010	90-3290	17 Mar 2012	Rapiscan	620 DV	7090402	Jan. 2009	
Instrument #2	Radcal	10X5-1800	10302	17 Mar 2012	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture		
Instrument #3	Radcal	10X5-180	18836	17 Mar 2012	Type	Checkpoint <input checked="" type="checkbox"/>	EDS:	In-line <input type="checkbox"/>	Stand-Alone <input type="checkbox"/>
Instrument #4	WB Johnson	TVX-2000	40155	Resp Chkd*	Manufacturer Survey Date		1 Mar 2011		
VISUAL INSPECTION									
<input type="checkbox"/> Y <input type="checkbox"/> N	Requirement				<input type="checkbox"/> Y <input type="checkbox"/> N	Requirement			
<input checked="" type="checkbox"/>	Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i))				<input checked="" type="checkbox"/>	Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii))			
<input checked="" type="checkbox"/>	Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? Missing at exit port (21 CFR 1020.40(c)(8)(ii))				<input checked="" type="checkbox"/>	Leaded drapes in good condition?			
<input checked="" type="checkbox"/>	Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii))				<input checked="" type="checkbox"/>	Interlocks not bypassed?			
<input checked="" type="checkbox"/>	One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv))				<input type="checkbox"/>	Current User's Manual available? (21 CFR 1020.40(c)(9))			
<input checked="" type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))				<input type="checkbox"/>	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))			
<input checked="" type="checkbox"/>	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 of cabinet scanned with Instrument #4. All scanning results below action levels? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (If no, explain below)									
DOSE TO BAGGAGE					EXPOSURE OUTSIDE CABINET				
Trial	Exposure (X_i)				Ambient Background 0.00 μR				
1	0.7104 mR	X_{avg}	0.71	mR	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	0.7098 mR	CV	0.0136		a	5.03 μR	5.0 min	0.060 mR	PASS
3	0.7007 mR	Coefficient of Variation (CV): $CV = (1/X_{avg})(\sum(X_i - X_{avg})^2/(n-1))^{1/2}$			b	7.07 μR	5.0 min	0.085 mR	PASS
4	0.7011 mR				c	9.93 μR	5.0 min	0.119 mR	PASS
5	0.7245 mR				d	μR	5.0 min	mR	
					e	μR	5.0 min	mR	
COMMENTS AND RECOMMENDATIONS									
Dose to baggage measured with instrument #1/#2 combination. Exposure outside cabinet measured with instrument #1/#2 combination. *Instrument was response checked before and after surveys. Additional measurement made at location "c" because of proximity to operator's location. Exposure outside cabinet measurements made with empty bins being x-rayed by the system.									

Survey Notes Provided on 20 July 2011

Exit Briefing Notes

1. Project Information.

- a. Radiation Protection Survey No. 26-MF-0EVU-11
- b. Survey dates: 18-19 July 2011
- c. Fort Lauderdale-Hollywood International Airport (FLL), Fort Lauderdale, FL
- d. Survey Officer(s): ██████████ CHP, U.S. Army Public Health Command (USAPHC); ██████████ Research Analyst, USAPHC; ██████████ CHP, Consolidated Safety Services (CSS); and ██████████ Safety Specialist, CSS.

2. Background Information.

a. TSA Headquarters Contact: Jill Segraves, Director, Occupational Safety, Health, and Environment, phone: ██████████

b. Airport Contact: Larry Burns, FLL Administrative Officer, ██████████
██████████

c. Individuals assisting the survey team:

Name	Title/Position
William Plasencia	LTSO, Equipment Specialist
Sheila Baldwin	LTSO, Collateral Duty Safety Officer

d. Systems surveyed

(1) X-Ray Personnel Screening Systems:

Model	Serial No.	Location
Rapiscan Secure 1000 SP	S51003007	Terminal 1 Checkpoint C, Lane 1
Rapiscan Secure 1000 SP	S51003008	Terminal 1 Checkpoint C, Lane 3/4
Rapiscan Secure 1000 SP	S51003009	Terminal 2 Checkpoint D, Lane 1
Rapiscan Secure 1000 SP	S51003010	Terminal 2 Checkpoint D, Lane 3/4
Rapiscan Secure 1000 SP	S51003004	Terminal 3 Checkpoint E, Lane 4
Rapiscan Secure 1000 SP	S51003005	Terminal 3 Checkpoint F, Lane 1/2
Rapiscan Secure 1000 SP	S51003006	Terminal 3 Checkpoint F, Lane 3
Rapiscan Secure 1000 SP	S51003011	Terminal 4 Checkpoint H, Lane 3/4
Rapiscan Secure 1000 SP	S51003012	Terminal 4 Checkpoint H, Lane 5/6

(2) Cabinet X-Ray System:

Model	Serial No.	Location
Rapiscan 620 DV	7090402	Terminal 2 Checkpoint D, Lane 1

3. Findings and Recommendations.

a. X-Ray Personnel Screening Systems:

(1) All x-ray personnel screening systems surveyed 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. One system at Terminal 3 Checkpoint E (Serial No. 51003003) was inoperable and therefore, unable to be surveyed.

(2) All systems surveyed were found to be in compliance with the other requirements of ANSI/HPS N43.17-2009, with the following exception - the warning label "Caution: X-Rays Produced when Energized" was not present at the location where scans can be initiated for all Rapiscan Secure 1000SP systems. The label was posted on the systems; however, it was not posted at the location where scans can be initiated.

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

(a) Rapiscan Secure 1000 SP, Serial No. S51003010, Terminal 2 Checkpoint D, Lane 3/4: The slave unit made unusually loud idle noise. Request service provider to check during next visit.

(b) Rapiscan Secure 1000 SP, Serial No. S51003005, Terminal 3 Checkpoint F, Lane 1/2: The slave unit made unusually loud idle noise and the master unit made squeaking noises during travel. Request service provider to check during next visit.

(c) Rapiscan Secure 1000 SP, Serial No. S51003011, Terminal 4 Checkpoint H, Lane 3/4: Both the master and slave units made unusually loud idle noises. Request service provider to check during next visit.

b. Cabinet X-ray System

(1) The cabinet x-ray system surveyed was found to be in compliance with the radiation emission limits of Title 21, Code of Federal Regulations, Section 1020.40.

MCHB-TS-OHP

Exit Briefing Notes, FLL, Fort Lauderdale, FL, 18-19 July 2011

(2) The system surveyed was found to be in compliance with the other requirements of Title 21, Code of Federal Regulations, Section 1020.40, with the following exception – the warning label “Caution: Do Not Insert Any Part of the Body When System is Energized – X-Ray Hazard” was not present at the exit port.

c. 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 per year.