



**Transportation
Security
Administration**

May 21, 2012

Mr. Leopoldo R. Vasquez Jr.
Federal Security Director
Transportation Security Administration
Brownsville-San Padre Island International Airport (BRO)

Dear Mr. Vasquez:

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 the general-use backscatter x-ray AIT and cabinet x-ray systems used at TSA BRO was conducted on March 9, 2012, by a team of certified 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 System

One general-use backscatter x-ray AIT system was 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 this general-use backscatter x-ray AIT system provided appropriate operating procedures are followed. In addition, the general-use backscatter x-ray AIT system was in compliance with other (non-emission) requirements of ANSI/HPS N43.17-2009. See the attached report and the applicable survey worksheet (Enclosure 1 of attached report).

Cabinet X-ray Systems

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

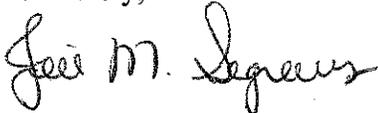
A total of two cabinet x-ray systems were surveyed and found to be in compliance with the emissions limit specified in Title 21, CFR, Subchapter J, Section 1020.40. There are no health hazards associated with the use of these cabinet x-ray systems provided appropriate operating procedures are followed. In addition, the cabinet x-ray systems complied with other (non-emission) requirements of Title 21, CFR, Subchapter J, Section 1020.40.

No corrective actions are required for any of the screening systems at TSA BRO at this time.

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: Ms. Audrey Warren, Deputy Federal Security Director / Designated Occupational Safety and Health Official (SAT)
Mr. Jimmy Briseno, Assistant Federal Security Director – Screening (HRL)
Ms. Christine Halfacre, Chief of Staff, Office of Security Technology

Enclosure: TSA BRO 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-17 OSHE
601 South 12th Street
Arlington, Virginia 20598-6017

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 SAT/BRO/HRL/LRD/MFE/CRP Radiation Survey Visit, 16 February 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 9 March 2012 at Brownsville-South Padre Island International Airport (BRO), Brownsville, TX, Project No. 26-MF-0FRV-12. The survey was performed to:

- a. Evaluate the advanced imaging technology (AIT) x-ray system to ensure compliance with the requirements of ANSI/HPS N43.17-2009.
- b. Evaluate the 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] Certified Health Physicist (CHP), Health Physics Program, Army Institute of Public Health (AIPH) and [REDACTED] CHP, Consolidated Safety Services. A total of one AIT x-ray system was evaluated for compliance with the requirements of ANSI/HPS N43.17-2009 and two cabinet x-ray systems were evaluated for compliance with the requirements of Title 21, CFR, Subchapter J. The survey results for the AIT system are provided in Enclosure 1. The survey results for each cabinet x-ray system are provided in Enclosure 2.

The AIT x-ray system tested was 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.

The AIT system surveyed was found to be in compliance with the other requirements of ANSI/HPS N43.17-2009.

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

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. Jimmy Briseno, Assistant Federal Security Director on 9 March 2012. Draft survey notes were provided via electronic mail on 10 March 2012. A copy of the final 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

3 Enclosures

Survey Results for One AIT X-Ray System

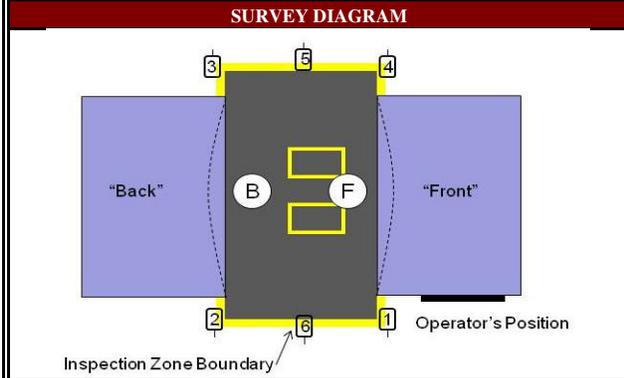
Survey Worksheet - AIT X-Ray Systems

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

SURVEY DATA				SURVEY LOCATION			
Project No.	26-MF-0FRV-12			Location	Checkpoint		
Survey Date	9 Mar 2012			Organization	Brownsville-South Padre Island International Airport		
Surveyor(s)	[Redacted]			Street Address	700 S. Amelia Earhart Dr.		
				City/Installation	Brownsville	State	TX

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3378	30 Sep 2012	Rapiscan	Secure 1000 SP	S51009001	Mar 2010
Instrument #2	Radcal	10X5-1800	17959	30 Sep 2012	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	Ludlum	3	286054	27 Sep 2012	Service Provider Survey Date	15 Mar 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.			



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	0.00 μR						
#2	0.00 μR						
#3	0.00 μR						
#4	0.00 μR						
#5	0.00 μR		#6	0.00 μR			

Measurements made with Instruments #1 & #2

DOSE PER SCREENING				
	Exposure (X)			Reference Effective Dose per Screening (max 25 μrem): 1.8 μrem or 0.018 μSv
Trial	"Front" Side	"Back" Side		
a	5.75 μR	5.62 μR		
b	5.76 μR	5.63 μR		
c	5.69 μR	5.69 μR		
d	5.75 μR	5.63 μR		
e	5.69 μR	5.70 μR		
AVG	5.73 μR	5.65 μR		
Energy Correction Factor	1.25			
Measurements made with Instruments #1 & #2				RESULT PASS

BEAM QUALITY				
	Exposure (X)			HVL "Front" Side 1.2 mm Al HVL "Back" Side 1.2 mm Al Conversion Factor 0.128 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
mm Al	"Front" Side	"Back" Side		
0	1.61 μR	1.75 μR		
0	1.87 μR	1.81 μR		
1	0.90 μR	0.97 μR		
1	0.97 μR	0.97 μR		
1.5	0.71 μR	0.71 μR		
1.5	0.77 μR	0.78 μR		
Measurements made with Instruments #1 & #2				RESULT PASS

COMMENTS AND RECOMMENDATIONS

* Access door on slave side was unlocked when the survey started. The key was obtained and the door was locked prior to the end of the survey.

Survey Results for Two Cabinet X-Ray Systems

Survey Worksheet - Cabinet X-Ray Systems

Health Physics Program
U.S. Army Public Health Command

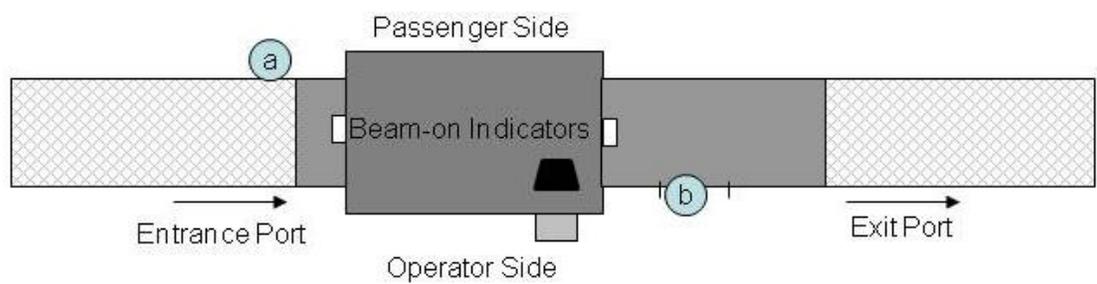
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA				SURVEY LOCATION			
Project No.	26-MF-0FRV-12			Location	Checkpoint		
Survey Date	9 Mar 2012			Organization	Brownsville-South Padre Island International Airport		
Surveyor(s)	[REDACTED]			Street Address	700 S. Amelia Earhart Dr.		
				City/Installation	Brownsville	State	TX

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3378	30 Sep 2012	Rapiscan	522B	7034013	Oct 2003
Instrument #2	Radcal	10X5-1800	17959	30 Sep 2012	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Hawthorne, CA
Instrument #3	Radcal	10X5-180	22359	30 Sep 2012	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/>	Stand-Alone <input type="checkbox"/>
Instrument #4	Ludlum	3	286054	27 Sep 2012	Manufacturer Survey Date	8 Sep 2011		

Y		N		Requirement		Y		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? (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 checked="" type="checkbox"/>				Current User's Manual available? (21 CFR 1020.40(c)(9))	
<input checked="" type="checkbox"/>				Key Activated Control present? (21 CFR 1020.40(c)(6)(i))		<input checked="" 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 No (If no, explain below)

DOSE TO BAGGAGE				EXPOSURE OUTSIDE CABINET				
Trial	Exposure (X _i)			Ambient Background	0.00 μR			
1	0.1464 mR			Location	Exposure	Time	Exposure in 1 hr	RESULT
2	0.1538 mR	X _{avg}	0.16 mR	a	0.65 μR	5.0 min	0.008 mR	PASS
3	0.1607 mR	CV	0.0364	b	0.65 μR	5.0 min	0.008 mR	PASS
4	0.1549 mR	Coefficient of Variation (CV):		c	μR	min	mR	
5	0.1594 mR	CV = (1/X _{avg})(Σ(X _i - X _{avg}) ² /(n-1)) ^{1/2}		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.

Survey Worksheet - Cabinet X-Ray Systems

Health Physics Program
U.S. Army Public Health Command

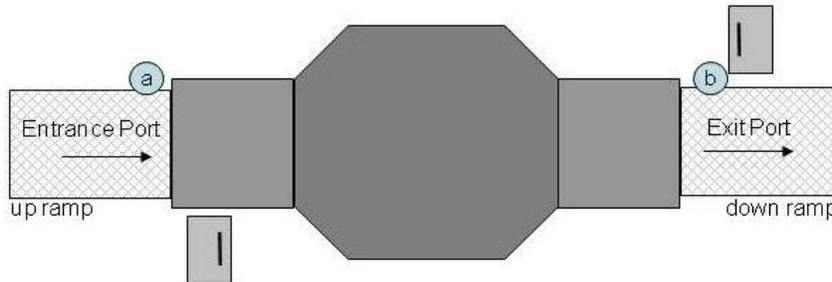
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA					SURVEY LOCATION					
Project No.	26-MF-0FRV-12				Location	Checked Baggage				
Survey Date	9 Mar 2012				Organization	Brownsville-South Padre Island International Airport				
Surveyor(s)	[REDACTED]				Street Address	700 S. Amelia Earhart Dr.				
					City/Installation	Brownsville	State	TX	ZIP	78521

INSTRUMENTS USED					SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date	
Instrument #1	Radcal	9010	90-3378	30 Sep 2012	Reveal	CT-80DR	040581	Jun 2009	
Instrument #2	Radcal	10X5-180	17959	30 Sep 2012	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture Bedford, MA		
Instrument #3	Radcal	10X5-180	22359	30 Sep 2012	Type	Checkpoint <input type="checkbox"/>	EDS: In-line <input type="checkbox"/>	Stand-Alone <input checked="" type="checkbox"/>	<input type="checkbox"/>
Instrument #4	Ludlum	3	286054	27 Sep 2012	Manufacturer Survey Date		6 Jan 2012		

VISUAL INSPECTION										
Y	N	Requirement				Y	N	Requirement		
<input checked="" type="checkbox"/>	<input 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"/>	<input 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"/>	<input type="checkbox"/>	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))				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Leaded drapes in good condition?		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii))				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Interlocks not bypassed?		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv))				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Current User's Manual available? (21 CFR 1020.40(c)(9))		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.40(c)(6)(i))				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))				<input type="checkbox"/>	<input checked="" type="checkbox"/>	NT=not tested; NA=not applicable.		

SURVEY DIAGRAM



Accessible exterior surfaces of cabinet scanned with Instrument #4. All scanning results below action levels? Yes No (If no, explain below)

DOSE TO BAGGAGE				EXPOSURE OUTSIDE CABINET					
Trial	Exposure (X_i)			Ambient Background	0.00 μ R				
1	24.90	mR		Location	Exposure	Time	Exposure in 1 hr	RESULT	
2	33.50	mR		a	0.71 μ R	5.0 min	0.009 mR	PASS	
3	24.82	mR		b	4.28 μ R	5.0 min	0.051 mR	PASS	
4	31.67	mR		c	μ R	min	mR		
5	24.67	mR		d	μ R	min	mR		
				e	μ R	min	mR		

$X_{avg} = 27.9$ mR

CV = 0.1546

Coefficient of Variation (CV):

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

COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#3 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.

Final Survey Notes

Final Survey Notes

1. Project Information.

- a. Radiation Protection Survey No. 26-MF-0FRV-12
- b. Survey dates: 9 March 2012
- c. Brownsville-South Padre Island International Airport (BRO), Brownsville, TX
- d. Survey Officer(s): [REDACTED] CHP and [REDACTED] CHP

2. Background Information.

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

b. Airport Contact: Jimmy Briseno, Assistant Federal Security Director, Phone: [REDACTED]

c. Individual Assisting the Survey Team:

Name	Title/Position
[REDACTED]	Health Physicist, TSA HQ

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

Model	Serial No.	Location
Rapiscan Secure 1000 SP	S51009001	Checkpoint

e. Cabinet X-Ray Systems Surveyed:

Model	Serial No.	Location
Rapiscan 522B	7034013	Checkpoint
Reveal CT-80 DR	040581	Checked Baggage

3. Findings and Recommendations.

a. AIT (Backscatter X-Ray) System.

(1) The x-ray personnel screening system surveyed was 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.

MCHB-TS-OHP

Final Survey Notes, BRO, Brownsville, TX, 23 Mar 12

(2) The system surveyed was found to be in compliance with the other requirements of ANSI/HPS N43.17-2009.

b. Cabinet X-ray Systems.

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

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