



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

28 DEC 2010

Health Physics Program

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

Dear Ms. Segraves:

This letter is in reference to the Memorandum of Agreement between the US Army Medical Command and the Transportation Security Administration signed September 10, 2008; Title 21, Code of Federal Regulations, Subchapter J; and American National Standards Institute/Health Physics Society (ANSI/HPS) N43.17-2009, Radiation Safety for Personnel Security Screening Systems Using X-Ray or Gamma Radiation.

A previous survey report (26-MF-TSAX-BOS-10) for advanced imaging technology X-ray systems at Boston Logan International Airport contained a typographical error in the units of measurement listed for the half-value layer measurements. The original survey worksheets indicated the measured exposures made for the half-value were in units of milliroentgen (mR). These measurements should have been reported in units of microroentgen ( $\mu$ R). In addition, the worksheets included in the original report did not contain calibration due date information for the radiation measurement equipment used.

During a review of our methods for calculating the reference effective dose, we identified an issue with the ANSI/HPS N43.17-2009 standard for dual-beam systems that results in a slight underestimation of the effective dose per screening received by an individual. The standard states that the measurement will be made at the point of maximum exposure over the number of scans needed for an entire screening. It was also determined that the ANSI/HPS N43.17-2009 methodology assumes that both sides of the scanner contribute equally to the measurement. For dual-beam systems, such as the Secure 1000 SP, the measured value includes contributions of both x-ray tubes, but those contributions are not equal.

Subsequent analysis indicated that simply multiplying the measurement by two produces a slight overestimate of the effective dose. Since an overestimate of the effective dose is preferable to an underestimate and the skin entrance exposure for each tube cannot be measured separately without the assistance of a service engineer, this simple correction was adopted.

Note that the general conclusion in the report was not affected by the above changes. The updated reference effective dose values are still well below the radiation dose per screening limits specified in ANSI/HPS N43.17-2009. There are no health hazards associated with the use of these systems provided appropriate operating procedures are followed. The survey worksheets have been corrected and are provided at Enclosure 1.

In addition, the calibration due date of the Radcal Model 9010 controller (serial number 90-3291) was listed incorrectly as March 9, 2010 (a month prior to the survey). This instrument was calibrated on March 4, 2010. Therefore, the correct calibration due date is March 4, 2011. A copy of the Radcal Model 9010 controller calibration report is provided at Enclosure 2.

For more information concerning the survey report, please contact the Health Physics Program at [REDACTED].

Sincerely,

[REDACTED]

[REDACTED] CIH  
Portfolio Director  
Occupational Health Sciences

Enclosures

Corrected Survey Worksheets for 4 AIT and 27 Cabinet X-Ray Systems at BOS

**Enclosure 1**

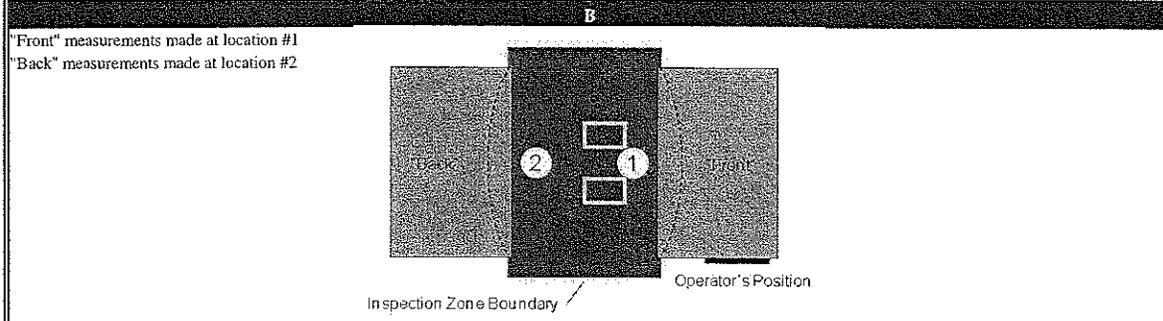
# Survey Worksheet - AIT X-Ray Systems

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

SURVEY DATA				SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10			Location	Terminal A, Delta Checkpoint, Lane 7-8		
Survey Date	19 Apr 2010			Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]			Street Address	2 Service Rd, 3rd Floor		
				City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Rapiscan	Secure 1000SP	S50948002	Nov 2009
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	1 Mar 2010		

VISUAL INSPECTION				
Y	N	Requirement	Y N	Requirement
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key activated control with key capture? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.c)	<input checked="" type="checkbox"/>	At least one lighted scan in progress indicator visible from the inspection zone? (ANSI N43.17-2009, paragraph 7.2.1.b)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	"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)	<input checked="" type="checkbox"/>	X-ray emission terminates after a present time or exposure? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.e)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Technique factors preset for each mode of operation? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.b)	<input checked="" type="checkbox"/>	Operators have a clear view of the scanning area? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.f)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to initiate emission of radiation other than an interlock or main power control? (ANSI N43.17-2009, paragraph 7.2.1.d)	<input checked="" type="checkbox"/>	Tool or key required to open or remove access panels? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.i)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to terminate emission of radiation other than an interlock? (ANSI N43.17-2009, paragraph 7.2.1.e)	<input type="checkbox"/>	User provided with required information? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.5)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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.	



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

DOSE PER SCREENING					BEAM QUALITY					
Trial	Exposure (X)		Reference Effective Dose per Screening (max 25 µrem):	mm Al	Exposure (X)		HVL "Front" Side	HVL "Back" Side	Conversion Factor	‡Minimum Filtration
	"Front" Side	"Back" Side			"Front" Side	"Back" Side				
1	6.52 µR	6.06 µR	2.52 µrem or 0.0252 µSv	0	1.91 µR	1.72 µR	1.0	1.4	0.150	1.0
2	6.72 µR	6.06 µR		0	1.98 µR	1.72 µR				
3	6.72 µR	6.06 µR		1	0.99 µR	0.99 µR				
4	6.85 µR	6.06 µR		1	0.99 µR	0.93 µR				
5	6.78 µR	6.13 µR		1.5	0.79 µR	0.86 µR				
AVG	6.72 µR	6.07 µR		1.5	0.86 µR	0.79 µR				
Energy Correction Factor	1.25									

RESULT  FAIL  PASS

### COMMENTS AND RECOMMENDATIONS

\* A "Stop" button is provided on each side of the system. It is not known whether this is an emergency stop that shuts off all power and requires a system restart, or if it simply terminates the screening cycle.

\*\* Two lighted indicators are provided -- one on each cabinet. However, the indicator functions only while the cabinet on which it is located is active. Since the front and back of the passenger are scanned sequentially, the passenger may think the screening is complete when the "front" indicator turns off even though the "back" scan has not been completed.

‡For this system 1 mm Al filtration is approximately equal to 1 mm Al HVL.

# Survey Worksheet - AIT X-Ray Systems

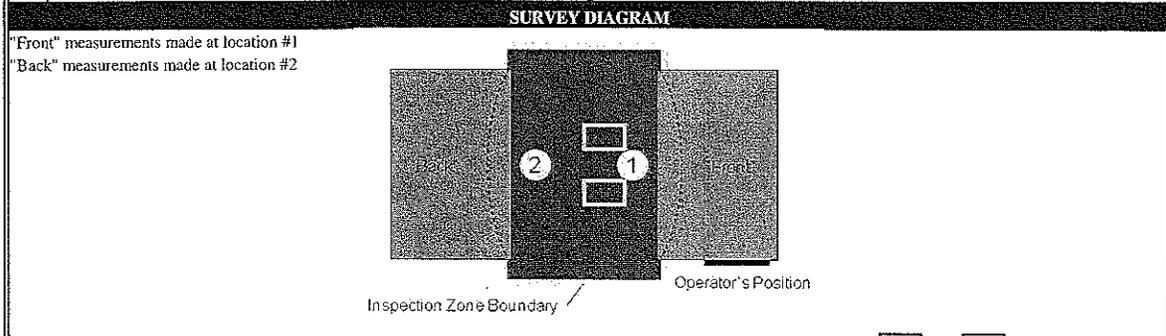
Health Physics Program  
U.S. Army Public Health Command (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal A, Delta Checkpoint, Lane 5-6		
Survey Date	19 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Rapiscan	Secure 1000SP	S50948003	Nov 2009
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	5 Mar 2010		

VISUAL INSPECTION			
Y	N	Requirement	Y N
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key activated control with key capture? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.c)	<input checked="" type="checkbox"/> **
<input type="checkbox"/>	<input checked="" type="checkbox"/>	"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)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Technique factors preset for each mode of operation? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.b)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to initiate emission of radiation other than an interlock or main power control? (ANSI N43.17-2009, paragraph 7.2.1.d)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to terminate emission of radiation other than an interlock? (ANSI N43.17-2009, paragraph 7.2.1.e)	<input type="checkbox"/> NT
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Scan in progress indicator visible for any location from which a scan can be initiated? (ANSI N43.17-2009, paragraph 7.2.1.a)	<input type="checkbox"/>

NT=not tested; NA=not applicable.



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

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
1	6.51 µR	6.12 µR	2.65 µrem or 0.0265 µSv		0	1.78 µR	1.45 µR
2	6.44 µR	6.05 µR			0	1.78 µR	1.45 µR
3	6.50 µR	6.12 µR			1	0.92 µR	0.86 µR
4	6.44 µR	6.18 µR			1	0.92 µR	0.92 µR
5	6.57 µR	6.12 µR			1.5	0.72 µR	0.72 µR
AVG	6.49 µR	6.12 µR	1.5	0.72 µR	0.72 µR		
Energy Correction Factor	1.25		RESULT <input checked="" type="checkbox"/> PASS				

**COMMENTS AND RECOMMENDATIONS**

\* A "Stop" button is provided on each side of the system. It is not known whether this is an emergency stop that shuts off all power and requires a system restart, or if it simply terminates the screening cycle.

\*\* Two lighted indicators are provided -- one on each cabinet. However, the indicator functions only while the cabinet on which it is located is active. Since the front and back of the passenger are scanned sequentially, the passenger may think the screening is complete when the "front" indicator turns off even though the "back" scan has not been completed.

‡For this system 1 mm Al filtration is approximately equal to 1 mm Al HVL.

Corrected copy: 9 December 2010

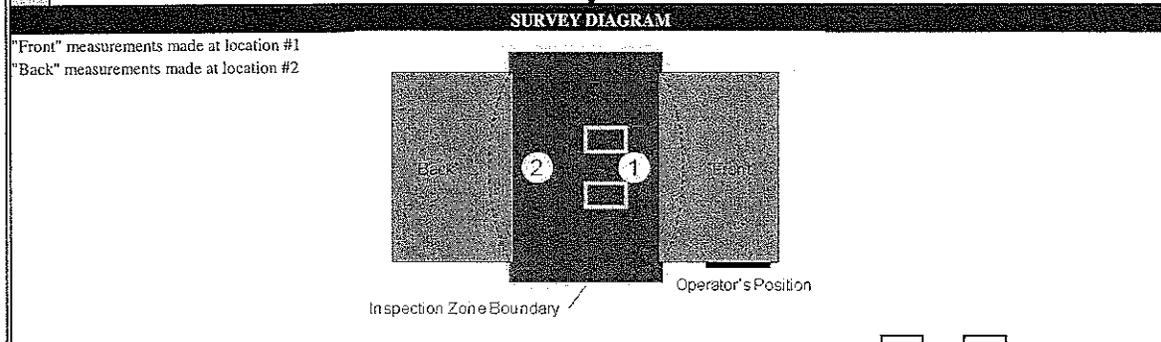
# Survey Worksheet - AIT X-Ray Systems

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

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal A, Delta Checkpoint, Lane 3-4		
Survey Date	19 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Rapiscan	Secure 1000SP	S50948004	Nov 2009
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	5 Mar 2010		

VISUAL INSPECTION			
Y	N	Requirement	Y N
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key activated control with key capture? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.c)	<input checked="" type="checkbox"/> **
<input type="checkbox"/>	<input checked="" type="checkbox"/>	"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)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Technique factors preset for each mode of operation? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.b)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to initiate emission of radiation other than an interlock or main power control? (ANSI N43.17-2009, paragraph 7.2.1.d)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to terminate emission of radiation other than an interlock? (ANSI N43.17-2009, paragraph 7.2.1.e)	NT
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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.



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

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
1	5.79 µR	5.87 µR	2.45 µrem		0	0.98 µR	1.51 µR
2	5.67 µR	5.80 µR	or		0	0.85 µR	1.57 µR
3	5.73 µR	5.87 µR	0.0245 µSv		1	0.52 µR	0.85 µR
4	5.74 µR	5.87 µR	RESULT <input type="checkbox"/> PASS		1	0.52 µR	0.85 µR
5	5.74 µR	5.87 µR			1.5	0.46 µR	0.72 µR
AVG	5.73 µR	5.86 µR			1.5	0.46 µR	0.66 µR
Energy Correction Factor	1.25						

**COMMENTS AND RECOMMENDATIONS**

\* A "Stop" button is provided on each side of the system. It is not known whether this is an emergency stop that shuts off all power and requires a system restart, or if it simply terminates the screening cycle.

\*\* Two lighted indicators are provided -- one on each cabinet. However, the indicator functions only while the cabinet on which it is located is active. Since the front and back of the passenger are scanned sequentially, the passenger may think the screening is complete when the "front" indicator turns off even though the "back" scan has not been completed.

‡For this system 1 mm Al filtration is approximately equal to 1 mm Al HVL.

Corrected copy: 9 December 2010

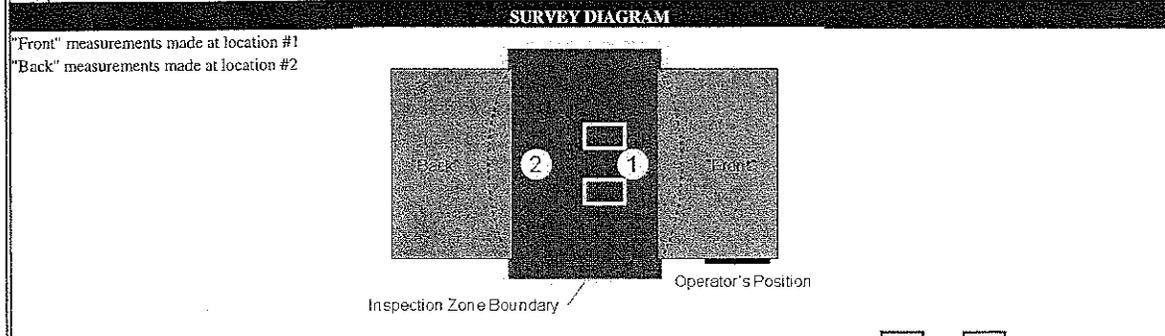
# Survey Worksheet - AIT X-Ray Systems

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

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal A, Delta Checkpoint, Lane 1-2		
Survey Date	19 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Rapiscan	Secure 1000SP	S50948005	Nov 2009
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	NA	Place of Manufacture	Torrance, CA
Instrument #3	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	25 Mar 2010		

VISUAL INSPECTION			
Y	N	Requirement	Y N
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key activated control with key capture? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.1.c)	<input checked="" type="checkbox"/> **
<input checked="" type="checkbox"/>	<input type="checkbox"/>	"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)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Technique factors preset for each mode of operation? (21 CFR 1020.31(j); ANSI N43.17-2009, paragraph 7.2.2.b)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to initiate emission of radiation other than an interlock or main power control? (ANSI N43.17-2009, paragraph 7.2.1.d)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to terminate emission of radiation other than an interlock? (ANSI N43.17-2009, paragraph 7.2.1.e)	NT
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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.



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

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
1	5.58 µR	6.63 µR	2.39 µrem	0	1.18 µR	2.04 µR	1.3 mm Al
2	5.97 µR	6.63 µR	or	0	1.18 µR	2.10 µR	HVL "Back" Side
3	6.03 µR	6.69 µR	0.0239 µSv	1	0.66 µR	1.18 µR	Conversion Factor
4	6.17 µR	6.83 µR	RESULT <input checked="" type="checkbox"/> PASS	1	0.72 µR	1.12 µR	‡Minimum Filtration
5	6.10 µR	6.76 µR		1.5	0.53 µR	0.92 µR	1.0 mm Al
AVG	5.97 µR	6.71 µR		1.5	0.53 µR	0.92 µR	RESULT <input checked="" type="checkbox"/> PASS
Energy Correction Factor	1.25						

**COMMENTS AND RECOMMENDATIONS**

\* A "Stop" button is provided on each side of the system. It is not known whether this is an emergency stop that shuts off all power and requires a system restart, or if it simply terminates the screening cycle.

\*\* Two lighted indicators are provided -- one on each cabinet. However, the indicator functions only while the cabinet on which it is located is active. Since the front and back of the passenger are scanned sequentially, the passenger may think the screening is complete when the "front" indicator turns off even though the "back" scan has not been completed.

‡For this system 1 mm Al filtration is approximately equal to 1 mm Al HVL.

Corrected copy: 9 December 2010

## Survey Worksheet - Cabinet X-Ray Systems

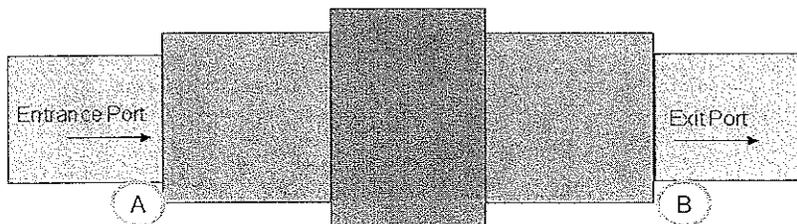
Health Physics Program  
U.S. Army Public Health Command (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION	
Project No.	26-MF-TSAX-BOS-10	Location	United/CSA/EDI
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor
		City/Installation	East Boston State MA ZIP 02128

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	L3	3DX 6000	6054	"0222"
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Peabody, MA
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint	EDS: In-line <input checked="" type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	1 Jul 2009		

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 1020.31(j))	<input checked="" type="checkbox"/>				Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input type="checkbox"/>	<input 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 <sub>i</sub> )		Ambient Background		μR		
1	179.80 mR	X <sub>avg</sub> 177.8 mR	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	175.90 mR	CV 0.0117	a	0.00 μR	5.0 min	0.000 mR	PASS
3	175.30 mR		b	1.59 μR	5.0 min	0.019 mR	PASS
4	179.40 mR	Coefficient of Variation (CV):	c	μR	5.0 min	mR	
5	178.80 mR	CV = (1/X <sub>avg</sub> ) * (Σ(X <sub>i</sub> - X <sub>avg</sub> ) <sup>2</sup> / (n-1)) <sup>1/2</sup>	d	μR	5.0 min	mR	
			e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

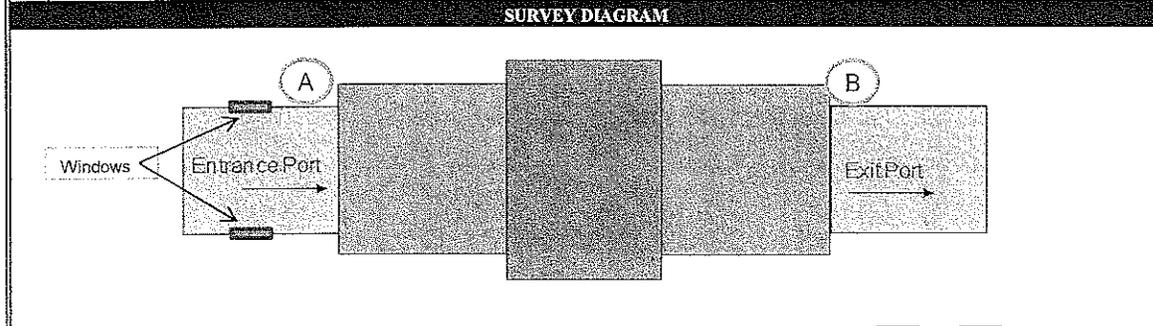
# Survey Worksheet - Cabinet X-Ray Systems

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

SURVEY DATA				SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10			Location	United/C3A/ED2		
Survey Date	19-23 Apr 2010			Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]			Street Address	2 Service Rd, 3rd Floor		
				City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	L3	3DX 6000	6055	"0222"
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Peabody, MA
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input type="checkbox"/>	EDS: In-line <input checked="" type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	1 Jul 2009		

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 1020.31(j))	<input checked="" 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))			NT=not tested; NA=not applicable.



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 <sub>i</sub> )			Ambient Background <span style="float: right;">μR</span>				
1	191.00 mR	X <sub>avg</sub>	193.3 mR	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	195.80 mR	CV	0.0108	a	0.00 μR	5.0 min	0.000 mR	PASS
3	195.30 mR	Coefficient of Variation (CV): CV = (1/X <sub>avg</sub> ) * (Σ(X <sub>i</sub> - X <sub>avg</sub> ) <sup>2</sup> / (n-1)) <sup>1/2</sup>		b	0.33 μR	5.0 min	0.004 mR	PASS
4	192.40 mR			c	μR	5.0 min	mR	
5	192.20 mR			d	μR	5.0 min	mR	
				e	μR	5.0 min	mR	

**COMMENTS AND RECOMMENDATIONS**

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

# Survey Worksheet - Cabinet X-Ray Systems

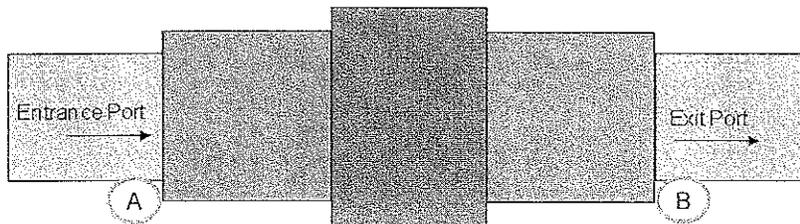
Health Physics Program  
U.S. Army Public Health Command (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal C/AirTran/C2A		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	L3	3DX 6000	6067	"0225"
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Peabody, MA
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input type="checkbox"/>	EDS: In-line <input checked="" type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	25 Mar 2010		

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 1020.31(j))	<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))	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 <sub>i</sub> )			Ambient Background <span style="float: right;">μR</span>				
1	195.90 mR	X <sub>avg</sub>	196.7 mR	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	195.90 mR	CV	0.007	a	0.13 μR	5.0 min	0.002 mR	PASS
3	198.80 mR	Coefficient of Variation (CV):		b	0.33 μR	5.0 min	0.004 mR	PASS
4	195.50 mR	$CV = (1/X_{avg})(\sum(X_i - X_{avg})^2/(n-1))^{1/2}$		c	μR	5.0 min	mR	
5	197.40 mR			d	μR	5.0 min	mR	
				e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

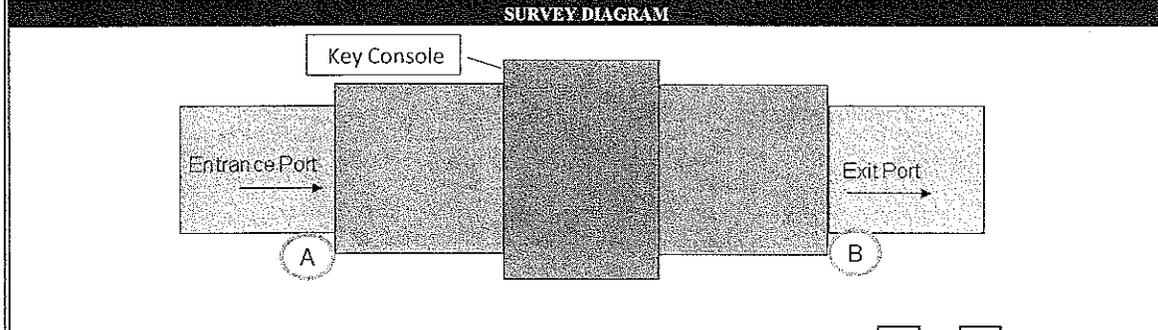
# Survey Worksheet - Cabinet X-Ray Systems

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

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal C/Jet Blue C2/ED4		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	L3	3DX 6000	6069	"0226"
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Peabody, MA
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input type="checkbox"/>	EDS: In-line <input checked="" type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	1 Jul 2009		

VISUAL INSPECTION			
Y	N	Requirement	Y   N
<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"/>
<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"/>
<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"/>
<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"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/>   <input type="checkbox"/>
<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.	



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 <sub>i</sub> )	X <sub>avg</sub>	CV	Ambient Background <input type="checkbox"/> μR				
1	199.50 mR	199.0 mR	0.0024	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	198.90 mR			a	0.00 μR	5.0 min	0.000 mR	PASS
3	198.60 mR			b	0.00 μR	5.0 min	0.000 mR	PASS
4	198.50 mR			c	μR	5.0 min	mR	
5	199.50 mR			d	μR	5.0 min	mR	
				e	μR	5.0 min	mR	

**COMMENTS AND RECOMMENDATIONS**

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

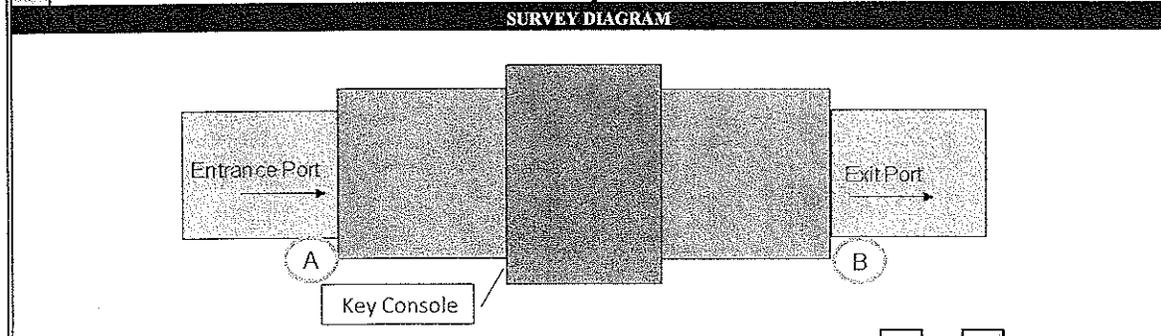
# Survey Worksheet - Cabinet X-Ray Systems

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

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal C/Jet Blue C2/ED3		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)		Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	L3	3DX 6000	6070	"0225"
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Peabody, MA
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input type="checkbox"/>	EDS: In-line <input checked="" type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	1 Jul 2009		

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"/>		Interlocks not bypassed?
<input checked="" type="checkbox"/>				Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii))			Current User's Manual available? (21 CFR 1020.40(c)(9))
<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"/>		Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>				Key Activated Control present? (21 CFR 1020.31(j))			
<input type="checkbox"/>	<input type="checkbox"/>			Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))			NT=not tested; NA=not applicable.



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 <sub>i</sub> )			Ambient Background <input type="checkbox"/> μR					
1	200.20 mR	X <sub>avg</sub>	200.1 mR	Location	Exposure	Time	Exposure in 1 hr	RESULT	
2	198.70 mR	CV	0.0048	a	1.12 μR	5.0 min	0.013 mR	PASS	
3	199.70 mR	Coefficient of Variation (CV): $CV = (1/X_{avg}) \{ \sum (X_i - X_{avg})^2 / (n-1) \}^{1/2}$		b	3.43 μR	5.0 min	0.041 mR	PASS	
4	201.30 mR			c	μR	5.0 min	mR		
5	200.40 mR			d	μR	5.0 min	mR		
				e	μR	5.0 min	mR		

**COMMENTS AND RECOMMENDATIONS**

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



## Survey Worksheet - Cabinet X-Ray Systems

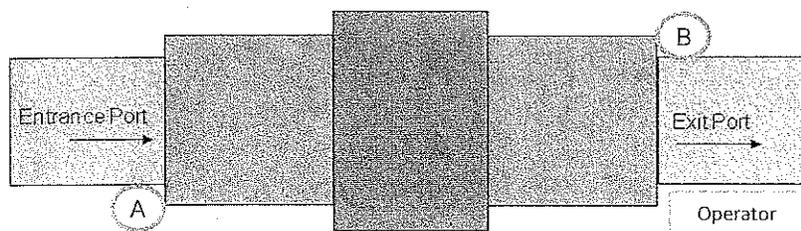
Health Physics Program  
U.S. Army Public Health Command (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal B/Virgin American/B5		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	L3	3DX 6000	6087	Jul 2002
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Peabody, MA
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input checked="" type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	21 Oct 2009		

VISUAL INSPECTION			
Y	N	Requirement	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"/> 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"/> 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"/> 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"/> Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" 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))	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 <sub>i</sub> )		Ambient Background <span style="float: right;">μR</span>				
1	195.90 mR	$X_{avg} = 196.2 \text{ mR}$ $CV = 0.0027$	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	196.30 mR		a	0.78 μR	5.0 min	0.009 mR	PASS
3	196.90 mR	Coefficient of Variation (CV): $CV = (1/X_{avg}) \sqrt{\sum (X_i - X_{avg})^2 / (n-1)}$	b	3.64 μR	5.0 min	0.044 mR	PASS
4	196.40 mR		c	μR	5.0 min	mR	
5	195.50 mR		d	μR	5.0 min	mR	
			e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

## Survey Worksheet - Cabinet X-Ray Systems

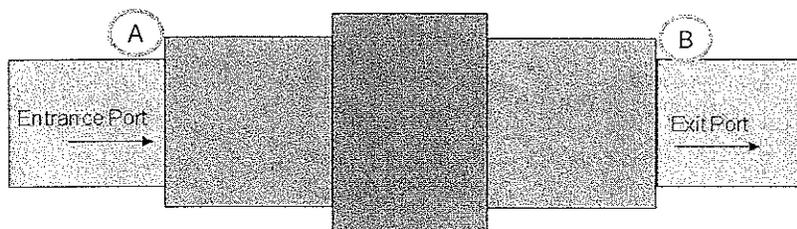
Health Physics Program  
U.S. Army Public Health Command (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal A/Delta Bag Room/SS1		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	L3	3DX 6000	6485	"0306"
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Peabody, MA
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input type="checkbox"/>	EDS: In-line <input checked="" type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	1 Jan 2009		

VISUAL INSPECTION			
Y	N	Requirement	Y N
<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"/>
<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"/>
<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"/>
<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"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/> <input type="checkbox"/>
<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																																																													
<table border="1" style="width: 100%;"> <tr> <td>Trial</td> <td>Exposure (X<sub>i</sub>)</td> </tr> <tr> <td>1</td> <td>198.20 mR</td> </tr> <tr> <td>2</td> <td>198.00 mR</td> </tr> <tr> <td>3</td> <td>198.50 mR</td> </tr> <tr> <td>4</td> <td>200.50 mR</td> </tr> <tr> <td>5</td> <td>200.20 mR</td> </tr> </table>	Trial	Exposure (X <sub>i</sub> )	1	198.20 mR	2	198.00 mR	3	198.50 mR	4	200.50 mR	5	200.20 mR	<table border="1" style="width: 100%;"> <tr> <td>X<sub>avg</sub></td> <td>199.1 mR</td> </tr> <tr> <td>CV</td> <td>0.0059</td> </tr> </table> <p style="text-align: center;">Coefficient of Variation (CV): CV = (1/X<sub>avg</sub>) * (Σ(X<sub>i</sub> - X<sub>avg</sub>)<sup>2</sup> / (n-1))<sup>1/2</sup></p>	X <sub>avg</sub>	199.1 mR	CV	0.0059	<table border="1" style="width: 100%;"> <tr> <th colspan="2">Ambient Background</th> <th colspan="3">μR</th> <th></th> </tr> <tr> <th>Location</th> <th>Exposure</th> <th>Time</th> <th>Exposure in 1 hr</th> <th>RESULT</th> <th></th> </tr> <tr> <td>a</td> <td>0.00 μR</td> <td>5.0 min</td> <td>0.000 mR</td> <td>PASS</td> <td></td> </tr> <tr> <td>b</td> <td>6.54 μR</td> <td>5.0 min</td> <td>0.078 mR</td> <td>PASS</td> <td></td> </tr> <tr> <td>c</td> <td>μR</td> <td>5.0 min</td> <td>mR</td> <td></td> <td></td> </tr> <tr> <td>d</td> <td>μR</td> <td>5.0 min</td> <td>mR</td> <td></td> <td></td> </tr> <tr> <td>e</td> <td>μR</td> <td>5.0 min</td> <td>mR</td> <td></td> <td></td> </tr> </table>					Ambient Background		μR				Location	Exposure	Time	Exposure in 1 hr	RESULT		a	0.00 μR	5.0 min	0.000 mR	PASS		b	6.54 μR	5.0 min	0.078 mR	PASS		c	μR	5.0 min	mR			d	μR	5.0 min	mR			e	μR	5.0 min	mR		
Trial	Exposure (X <sub>i</sub> )																																																															
1	198.20 mR																																																															
2	198.00 mR																																																															
3	198.50 mR																																																															
4	200.50 mR																																																															
5	200.20 mR																																																															
X <sub>avg</sub>	199.1 mR																																																															
CV	0.0059																																																															
Ambient Background		μR																																																														
Location	Exposure	Time	Exposure in 1 hr	RESULT																																																												
a	0.00 μR	5.0 min	0.000 mR	PASS																																																												
b	6.54 μR	5.0 min	0.078 mR	PASS																																																												
c	μR	5.0 min	mR																																																													
d	μR	5.0 min	mR																																																													
e	μR	5.0 min	mR																																																													

### COMMENTS AND RECOMMENDATIONS

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



# Survey Worksheet - Cabinet X-Ray Systems

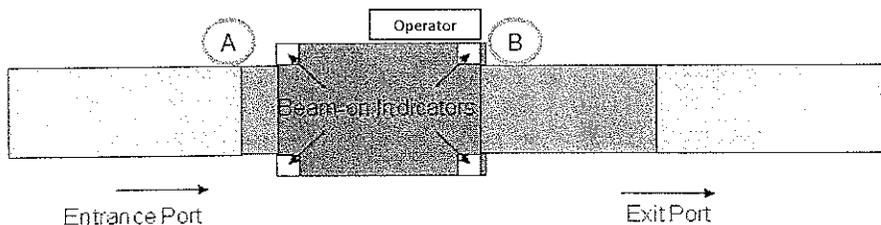
Health Physics Program  
 U.S. Army Public Health Command (Provisional)  
 Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal C/Jet Blue C2S/Lane 5		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	7555i	19445	Aug 2000
Instrument #2	Radcal	10X5-180	10302	29 Jan 2011	Certified	Yes	No	Place of Manufacture
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint	X	EDS: In-line
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	19 May 2008		

VISUAL INSPECTION			
Y	N	Requirement	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"/> 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"/> 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"/> 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"/> Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/> Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input 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 <sub>i</sub> )		Ambient Background <input type="checkbox"/> μR				
1	0.15	mR	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	0.13	mR	a	1.53 μR	5.0 min	0.018 mR	PASS
3	0.13	mR	b	1.20 μR	5.0 min	0.014 mR	PASS
4	0.14	mR	c	μR	5.0 min	mR	
5	0.12	mR	d	μR	5.0 min	mR	
			e	μR	5.0 min	mR	

X <sub>avg</sub>	0.1	mR
CV	0.076	

Coefficient of Variation (CV):  
 $CV = (1/X_{avg}) \sqrt{\sum(X_i - X_{avg})^2 / (n-1)}$

### COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#? 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 (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

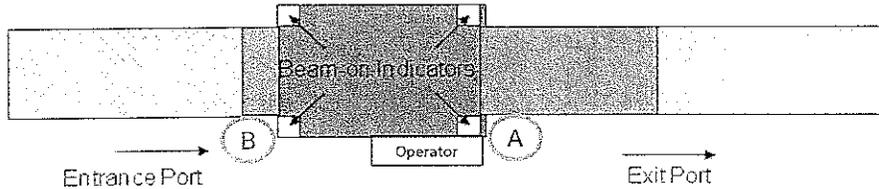
SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal C/Jet Blue C2S/Lane 2		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)		Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cul. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	7555i	19598	Sep 2000
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes	No	Place of Manufacture
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint	X	EDS: In-line Stand-Alone
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	25 Apr 2008		

VISUAL INSPECTION				
Y	N	Requirement	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	Interlocks not bypassed?
X		Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii))	X	Current User's Manual available? (21 CFR 1020.40(c)(9))
X		One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv))	X	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
X		Key Activated Control present? (21 CFR 1020.31(j))		
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 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 <sub>i</sub> )			Ambient Background <span style="float: right;">μR</span>				
1	0.16 mR	X <sub>avg</sub>	0.2 mR	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	0.16 mR	CV	0.0208	a	1.93 μR	5.0 min	0.023 mR	PASS
3	0.16 mR	Coefficient of Variation (CV): CV = (1/X <sub>avg</sub> ) * (Σ(X <sub>i</sub> - X <sub>avg</sub> ) <sup>2</sup> / (n-1)) <sup>1/2</sup>		b	1.67 μR	5.0 min	0.020 mR	PASS
4	0.17 mR			c	μR	5.0 min	mR	
5	0.16 mR			d	μR	5.0 min	mR	
				e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

## Survey Worksheet - Cabinet X-Ray Systems

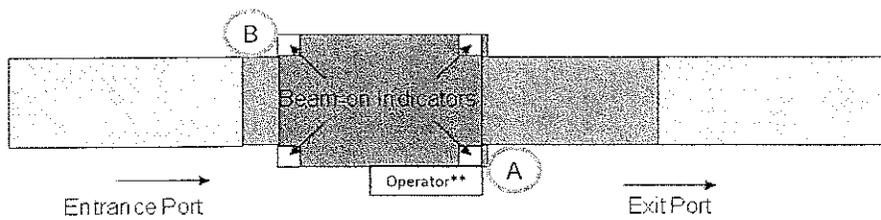
Health Physics Program  
U.S. Army Public Health Command (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal C/United C3S/Lane 1		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040i	19978	Nov 2000
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/>	Stand-Alone <input type="checkbox"/>
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	Not Found		

VISUAL INSPECTION			
Y	N	Requirement	Y N
<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"/>
<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"/>
<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"/>
<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"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/> <input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))	<input checked="" type="checkbox"/> <input 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 <sub>i</sub> )		Ambient Background <span style="float: right;">μR</span>				
1	0.11 mR	$\bar{X}_{avg} = 0.1 \text{ mR}$ $CV = 0.0346$	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	0.11 mR		a	6.30 μR	5.0 min	0.076 mR	PASS
3	0.10 mR	Coefficient of Variation (CV): $CV = (1/\bar{X}_{avg})(\sum(X_i - \bar{X}_{avg})^2/(n-1))^{1/2}$	b	6.10 μR	5.0 min	0.073 mR	PASS
4	0.11 mR		c	μR	5.0 min	mR	
5	0.11 mR		d	μR	5.0 min	mR	
			e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

\*\* Not recorded. Assumed position of the operator based on other operator's locations.

## Survey Worksheet - Cabinet X-Ray Systems

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

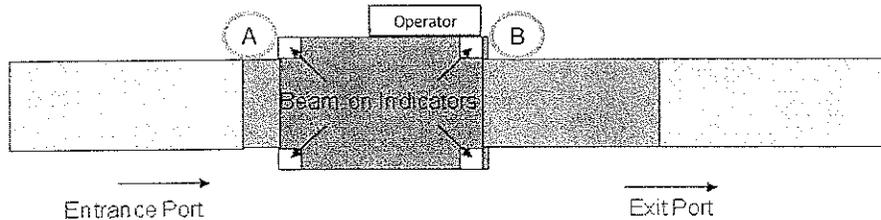
SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal C/United C3S/Lane 3		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cat. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040i	21213	Jun 2001
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	Not Found		

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"/>	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"/>	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"/>	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"/>	Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/>	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input 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 <sub>i</sub> )			Ambient Background <input type="checkbox"/> μR						
1	0.11	mR	X <sub>avg</sub>	0.1	mR	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	0.12	mR	CV	0.0574		a	3.31 μR	5.0 min	0.040 mR	PASS
3	0.11	mR	Coefficient of Variation (CV): CV = (1/X <sub>avg</sub> )Σ(X <sub>i</sub> - X <sub>avg</sub> ) <sup>2</sup> /(n-1) <sup>1/2</sup>			b	2.92 μR	5.0 min	0.035 mR	PASS
4	0.11	mR				c	μR	5.0 min	mR	
5	0.12	mR				d	μR	5.0 min	mR	
						e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#? 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 (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

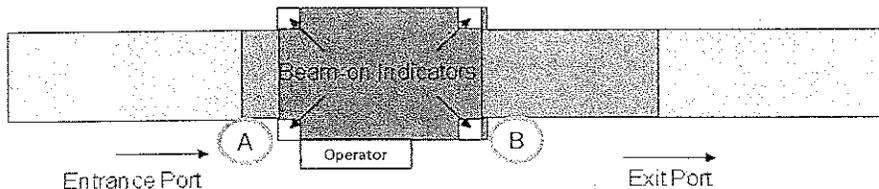
SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal B/American B5S/Lane 4		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	7555i	21343	Jun 2001
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	Not Found		

VISUAL INSPECTION	
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"/>	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"/>	Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii))
<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"/>	Key Activated Control present? (21 CFR 1020.31(j))
<input checked="" type="checkbox"/>	Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))
<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"/>	Leaded drapes in good condition?
<input checked="" type="checkbox"/>	Interlocks not bypassed?
<input checked="" type="checkbox"/>	Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))

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 <sub>i</sub> )			Ambient Background <span style="float: right;">μR</span>					
1	0.23	mR	$X_{avg} = 0.2 \text{ mR}$ $CV = 0.1807$ Coefficient of Variation (CV): $CV = (1/X_{avg})(\sum(X_i - X_{avg})^2 / (n-1))^{1/2}$	Location	Exposure	Time	Exposure in 1 hr	RESULT	
2	0.14	mR		a	0.00	μR	5.0 min	0.000 mR	PASS
3	0.17	mR		b	0.66	μR	5.0 min	0.008 mR	PASS
4	0.18	mR		c		μR	5.0 min	mR	
5	0.16	mR		d		μR	5.0 min	mR	
				e		μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

## Survey Worksheet - Cabinet X-Ray Systems

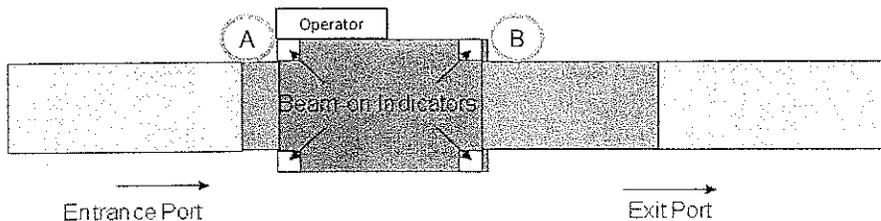
Health Physics Program  
 U.S. Army Public Health Command (Provisional)  
 Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal E/International E2/Lane 4		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cut. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040i	40146	Oct 2002
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	22 May 2009		

VISUAL INSPECTION			
Y	N	Requirement	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"/> 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"/> 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"/> 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"/> Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/> Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input 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 <sub>i</sub> )		Ambient Background <input type="checkbox"/> μR				
1	0.10 mR	$X_{avg} = 0.1 \text{ mR}$ $CV = 0.0535$ Coefficient of Variation (CV): $CV = (1/X_{avg})(\sum(X_i - X_{avg})^2/(n-1))^{1/2}$	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	0.11 mR		a	3.78 μR	5.0 min	0.045 mR	PASS
3	0.10 mR		b	0.13 μR	5.0 min	0.002 mR	PASS
4	0.10 mR		c	μR	5.0 min	mR	
5	0.10 mR		d	μR	5.0 min	mR	
			e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

# Survey Worksheet - Cabinet X-Ray Systems

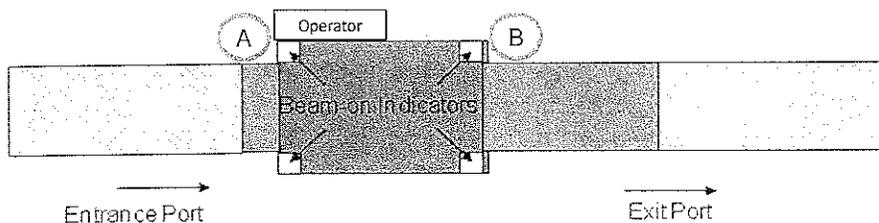
Health Physics Program  
 U.S. Army Public Health Command (Provisional)  
 Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal E/Southwest E1/Lane 2		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cat. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040i	40379	Oct 2003
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	11 May 2009		

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"/>	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"/>	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"/>	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"/>	Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/>	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input 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 <sub>i</sub> )			Ambient Background <span style="float: right;">μR</span>				
1	0.10	mR	X <sub>avg</sub> 0.1 mR	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	0.10	mR	CV 0.0257	a	0.93 μR	5.0 min	0.011 mR	PASS
3	0.11	mR		b	5.19 μR	5.0 min	0.062 mR	PASS
4	0.10	mR	Coefficient of Variation (CV):	c	μR	5.0 min	mR	
5	0.11	mR	CV = (1/X <sub>avg</sub> ) * (Σ(X <sub>i</sub> - X <sub>avg</sub> ) <sup>2</sup> / (n-1)) <sup>1/2</sup>	d	μR	5.0 min	mR	
				e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#? 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 (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

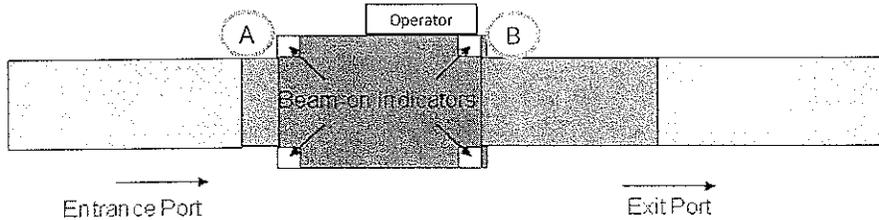
SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal A/Delta Checkpoint/Lane 7		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cul. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040i	40475	May 2004
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	Not Found		

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"/>	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"/>	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"/>	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"/>	Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/>	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input 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 <sub>i</sub> )			Ambient Background <input type="checkbox"/> μR				
1	0.11 mR	X <sub>avg</sub>	0.1 mR**	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	0.12 mR	CV	0.0499	a	0.00 μR	5.0 min	0.000 mR	PASS
3	0.12 mR	Coefficient of Variation (CV): CV = (1/X <sub>avg</sub> ) * (Σ(X <sub>i</sub> - X <sub>avg</sub> ) <sup>2</sup> / (n-1)) <sup>1/2</sup>		b*	1.10 μR	5.0 min	0.013 mR	PASS
4	0.13 mR			c	μR	5.0 min	mR	
5	0.12 mR			d	μR	5.0 min	mR	
				e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

\*Result includes a slight bump of the detector during the survey.  
\*\* One additional measurement yielded 0.2287 mR.

# Survey Worksheet - Cabinet X-Ray Systems

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

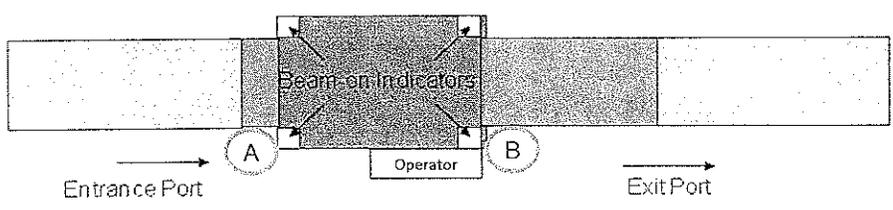
SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal E/Southwest E2/Lane 7		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)		Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED				SYSTEM INFORMATION				
Instrument #	Manufacturer	Model	Serial No.	Cat. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040AT	78485	Jun 2008
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	4 Mar 2010		

VISUAL INSPECTION	
Requirement	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 1020.31(j))	<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 <sub>i</sub> )			Ambient Background <span style="float: right;">μR</span>				
1	0.98 mR	$X_{avg} = 1.0 \text{ mR}$ $CV = 0.0046$ <p style="text-align: center;">Coefficient of Variation (CV):  <math>CV = (1/X_{avg})(\sum(X_i - X_{avg})^2/(n-1))^{1/2}</math> </p>	Location	Exposure	Time	Exposure in 1 hr	RESULT	
2	0.98 mR		a	1.60 μR	5.0 min	0.019 mR	PASS	
3	0.99 mR		b**	1.07 μR	5.0 min	0.013 mR	PASS	
4	0.97 mR		c	μR	5.0 min	mR		
5	0.98 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.

\*\* Detector bumped during survey.  
\* The lights were on constantly.

## Survey Worksheet - Cabinet X-Ray Systems

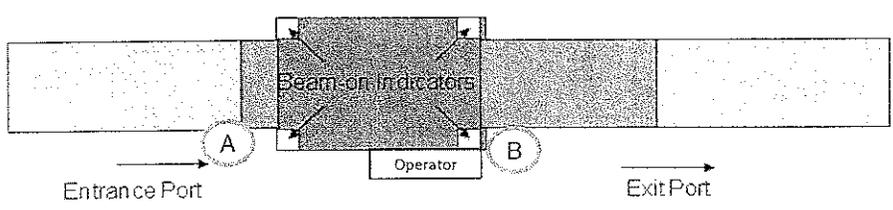
Health Physics Program  
U.S. Army Public Health Command (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal A/Delta Checkpoint/Lane 4		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040AT	79990	Nov 2008
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	Not Found		

VISUAL INSPECTION			
Y	N	Requirement	Y N
<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"/>
<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"/>
<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"/>
<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"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/> <input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))	<input checked="" type="checkbox"/> <input 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 <sub>i</sub> )			Ambient Background <input type="checkbox"/> μR					
1	1.60	mR	$X_{avg} = 1.2 \text{ mR}$ $CV = 0.1778$ Coefficient of Variation (CV): $CV = (1/X_{avg}) \sqrt{\sum (X_i - X_{avg})^2 / (n-1)}$	Location	Exposure	Time	Exposure in 1 hr	RESULT	
2	1.11	mR		a	1.59 μR	5.0 min	0.019 mR	PASS	
3	1.12	mR		b	1.65 μR	5.0 min	0.020 mR	PASS	
4	1.14	mR		c	μR	5.0 min	mR		
5	1.12	mR		d	μR	5.0 min	mR		
				e	μR	5.0 min	mR		

**COMMENTS AND RECOMMENDATIONS**

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

\* Labels present but very worn.

## Survey Worksheet - Cabinet X-Ray Systems

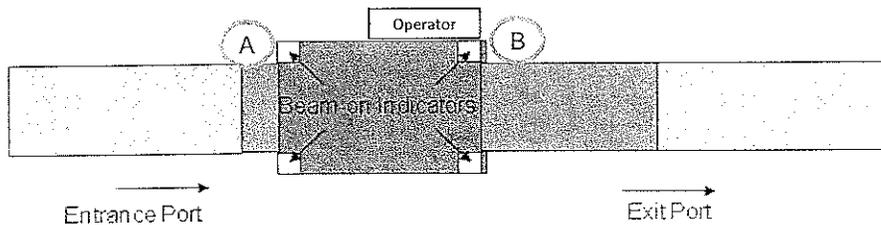
Health Physics Program  
U.S. Army Public Health Command (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal B/American B55A Lane 7		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)		Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040AT	80178	Dec 2008
Instrument #2	Radcal	10X5-180	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/>	Stand-Alone <input type="checkbox"/>
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date*	1 Apr 2010		

VISUAL INSPECTION			
Y	N	Requirement	Y/N
<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 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 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 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 checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))	<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																																
<table border="1" style="width: 100%;"> <tr> <td>Trials</td> <td>Exposure (X<sub>i</sub>)</td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>1.23</td> <td>mR</td> <td></td> </tr> <tr> <td>2</td> <td>1.16</td> <td>mR</td> <td></td> </tr> <tr> <td>3</td> <td>1.15</td> <td>mR</td> <td></td> </tr> <tr> <td>4</td> <td>1.15</td> <td>mR</td> <td></td> </tr> <tr> <td>5</td> <td>1.14</td> <td>mR</td> <td></td> </tr> </table>	Trials	Exposure (X <sub>i</sub> )			1	1.23	mR		2	1.16	mR		3	1.15	mR		4	1.15	mR		5	1.14	mR		<table border="1" style="width: 100%;"> <tr> <td>X<sub>avg</sub></td> <td>1.2</td> <td>mR</td> </tr> <tr> <td>CV</td> <td>0.0313</td> <td></td> </tr> </table>	X <sub>avg</sub>	1.2	mR	CV	0.0313		Ambient Background <span style="float: right;">μR</span>				
Trials	Exposure (X <sub>i</sub> )																																			
1	1.23	mR																																		
2	1.16	mR																																		
3	1.15	mR																																		
4	1.15	mR																																		
5	1.14	mR																																		
X <sub>avg</sub>	1.2	mR																																		
CV	0.0313																																			
Coefficient of Variation (CV): $CV = (1/X_{avg}) \cdot (\sum (X_i - X_{avg})^2 / (n-1))^{1/2}$		<table border="1" style="width: 100%;"> <thead> <tr> <th>Location</th> <th>Exposure</th> <th>Time</th> <th>Exposure in 1 hr</th> <th>RESULT</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>0.00 μR</td> <td>5.0 min</td> <td>0.000 mR</td> <td>PASS</td> </tr> <tr> <td>b</td> <td>1.11 μR</td> <td>5.0 min</td> <td>0.013 mR</td> <td>PASS</td> </tr> <tr> <td>c</td> <td>μR</td> <td>5.0 min</td> <td>mR</td> <td></td> </tr> <tr> <td>d</td> <td>μR</td> <td>5.0 min</td> <td>mR</td> <td></td> </tr> <tr> <td>e</td> <td>μR</td> <td>5.0 min</td> <td>mR</td> <td></td> </tr> </tbody> </table>	Location	Exposure	Time	Exposure in 1 hr	RESULT	a	0.00 μR	5.0 min	0.000 mR	PASS	b	1.11 μR	5.0 min	0.013 mR	PASS	c	μR	5.0 min	mR		d	μR	5.0 min	mR		e	μR	5.0 min	mR					
Location	Exposure	Time	Exposure in 1 hr	RESULT																																
a	0.00 μR	5.0 min	0.000 mR	PASS																																
b	1.11 μR	5.0 min	0.013 mR	PASS																																
c	μR	5.0 min	mR																																	
d	μR	5.0 min	mR																																	
e	μR	5.0 min	mR																																	

### COMMENTS AND RECOMMENDATIONS

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

\*Second label indicates a manufacture date of October 2008.

## Survey Worksheet - Cabinet X-Ray Systems

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

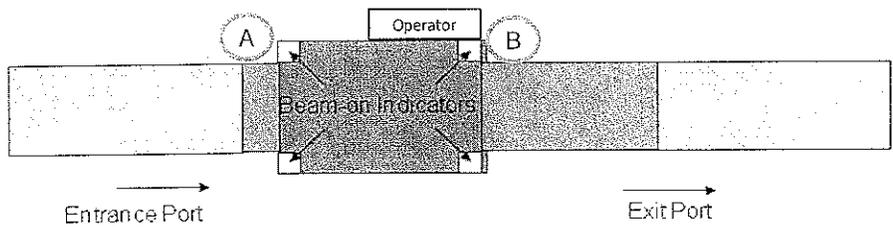
SURVEY DATA				SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10			Location	Terminal B-North/Virgin American		
Survey Date	19-23 Apr 2010			Organization	Boston's Logan International Airport		
Surveyor(s)				Street Address	2 Service Rd, 3rd Floor		
				City/Installation	East Boston	State	MA

INSTRUMENTS USED					SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date	
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	5040AT	80180	Oct 2008	
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture		Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS:	In-line <input type="checkbox"/>	Stand-Alone <input type="checkbox"/>
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date*		26 Mar 2010		

VISUAL INSPECTION			
Y	N	Requirement	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"/> 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"/> 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"/> 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"/> Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/> Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input 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				
<b>Trial</b>	<b>Exposure (X<sub>i</sub>)</b>			Ambient Background <span style="float: right;">μR</span>				
1	1.03 mR	$X_{avg}^{**} = 1.0 \text{ mR}$ $CV = 0.0071$  Coefficient of Variation (CV): $CV = (1/X_{avg})(\sum(X_i - X_{avg})^2/(n-1))^{1/2}$	<b>Location</b>	<b>Exposure</b>	<b>Time</b>	<b>Exposure in 1 hr</b>	<b>RESULT</b>	
2	1.03 mR		a	0.26 μR	5.0 min	0.003 mR	PASS	
3	1.03 mR		b	0.00 μR	5.0 min	0.000 mR	PASS	
4	1.05 mR		c	μR	5.0 min	mR		
5	1.03 mR		d	μR	5.0 min	mR		
			e	μR	5.0 min	mR		

**COMMENTS AND RECOMMENDATIONS**

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

\*\* First measurement was 2.196 mR and was not included in the average.

# Survey Worksheet - Cabinet X-Ray Systems

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

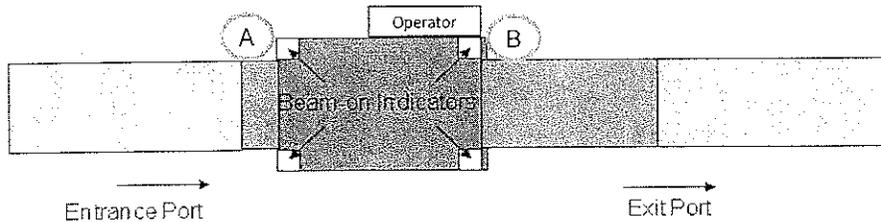
SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal B/US Air B1/Lane 1		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA

INSTRUMENTS USED				SYSTEM INFORMATION				
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040AT	80188	Oct 2008
Instrument #2	Radcal	10XS-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture Germany	
Instrument #3	Radcal	10XS-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date*		28 Mar 2010	

VISUAL INSPECTION			
Y	N	Requirement	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"/> 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"/> 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"/> 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"/> Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/> Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input 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 <sub>i</sub> )		Ambient Background <input type="checkbox"/> μR				
1	NT* mR	X <sub>avg</sub> ##### mR CV #####	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	NT* mR		a	0.93 μR	5.0 min	0.011 mR	PASS
3	NT* mR	Coefficient of Variation (CV): CV = (1/X <sub>avg</sub> ) * (Σ(X <sub>i</sub> - X <sub>avg</sub> ) <sup>2</sup> / (n-1)) <sup>1/2</sup>	b	0.86 μR	5.0 min	0.010 mR	PASS
4	NT* mR		c	μR	5.0 min	mR	
5	NT* mR		d	μR	5.0 min	mR	
			e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

\* Not tested.

# Survey Worksheet - Cabinet X-Ray Systems

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

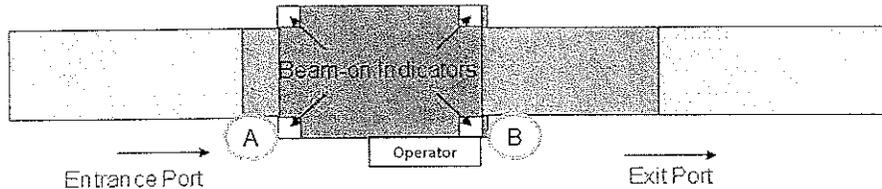
SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal E/Southwest E1/Lane 1		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)		Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040AT	80777	Jan 2009
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date*	13 Nov 2009		

VISUAL INSPECTION			
Y	N	Requirement	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"/> 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"/> 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"/> 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"/> Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/> Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input 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 <sub>i</sub> )		Ambient Background <span style="float: right;">μR</span>				
1	1.19 mR	$X_{avg} = 1.0$ mR $CV = 0.0856$ Coefficient of Variation (CV): $CV = (1/X_{avg}) \sqrt{\sum (X_i - X_{avg})^2 / (n-1)}$	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	1.00 mR		a	0.00 μR	5.0 min	0.000 mR	PASS
3	0.99 mR		b	0.60 μR	5.0 min	0.007 mR	PASS
4	1.00 mR		c	μR	5.0 min	mR	
5	0.99 mR		d	μR	5.0 min	mR	
			e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

\*One light was not working.

# Survey Worksheet - Cabinet X-Ray Systems

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

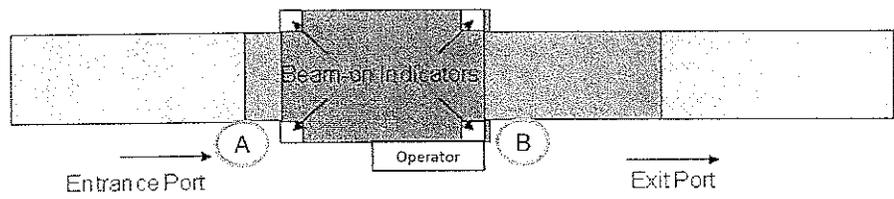
SURVEY DATA				SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10			Location	Terminal C/United C3S/Lane 4		
Survey Date	19-23 Apr 2010			Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]			Street Address	2 Service Rd, 3rd Floor		
				City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040AT	80778	Jan 2009
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture Germany	
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date*	Not Found		

VISUAL INSPECTION			
Y	N	Requirement	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"/> 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"/> 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"/> 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"/> Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/> Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input 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																																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Trial</th> <th>Exposure (X<sub>i</sub>)</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1.02</td> <td>mR</td> <td></td> </tr> <tr> <td>2</td> <td>1.02</td> <td>mR</td> <td></td> </tr> <tr> <td>3</td> <td>1.04</td> <td>mR</td> <td></td> </tr> <tr> <td>4</td> <td>1.04</td> <td>mR</td> <td></td> </tr> <tr> <td>5</td> <td>1.03</td> <td>mR</td> <td></td> </tr> </tbody> </table>	Trial	Exposure (X <sub>i</sub> )			1	1.02	mR		2	1.02	mR		3	1.04	mR		4	1.04	mR		5	1.03	mR		<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>X<sub>avg</sub></td> <td>1.0</td> <td>mR</td> </tr> <tr> <td>CV</td> <td>0.0105</td> <td></td> </tr> </tbody> </table>	X <sub>avg</sub>	1.0	mR	CV	0.0105		Ambient Background <input type="checkbox"/> $\mu$ R					
Trial	Exposure (X <sub>i</sub> )																																				
1	1.02	mR																																			
2	1.02	mR																																			
3	1.04	mR																																			
4	1.04	mR																																			
5	1.03	mR																																			
X <sub>avg</sub>	1.0	mR																																			
CV	0.0105																																				
Coefficient of Variation (CV): $CV = (1/X_{avg})(\sum(X_i - X_{avg})^2/(n-1))^{1/2}$		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Location</th> <th>Exposure</th> <th>Time</th> <th>Exposure in 1 hr</th> <th>RESULT</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>3.65 <math>\mu</math>R</td> <td>5.0 min</td> <td>0.044 mR</td> <td>PASS</td> </tr> <tr> <td>b</td> <td>3.33 <math>\mu</math>R</td> <td>5.0 min</td> <td>0.040 mR</td> <td>PASS</td> </tr> <tr> <td>c</td> <td><math>\mu</math>R</td> <td>5.0 min</td> <td>mR</td> <td></td> </tr> <tr> <td>d</td> <td><math>\mu</math>R</td> <td>5.0 min</td> <td>mR</td> <td></td> </tr> <tr> <td>e</td> <td><math>\mu</math>R</td> <td>5.0 min</td> <td>mR</td> <td></td> </tr> </tbody> </table>	Location	Exposure	Time	Exposure in 1 hr	RESULT	a	3.65 $\mu$ R	5.0 min	0.044 mR	PASS	b	3.33 $\mu$ R	5.0 min	0.040 mR	PASS	c	$\mu$ R	5.0 min	mR		d	$\mu$ R	5.0 min	mR		e	$\mu$ R	5.0 min	mR						
Location	Exposure	Time	Exposure in 1 hr	RESULT																																	
a	3.65 $\mu$ R	5.0 min	0.044 mR	PASS																																	
b	3.33 $\mu$ R	5.0 min	0.040 mR	PASS																																	
c	$\mu$ R	5.0 min	mR																																		
d	$\mu$ R	5.0 min	mR																																		
e	$\mu$ R	5.0 min	mR																																		

### COMMENTS AND RECOMMENDATIONS

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

\*Second label indicates a manufacture date of March 2009.

# Survey Worksheet - Cabinet X-Ray Systems

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

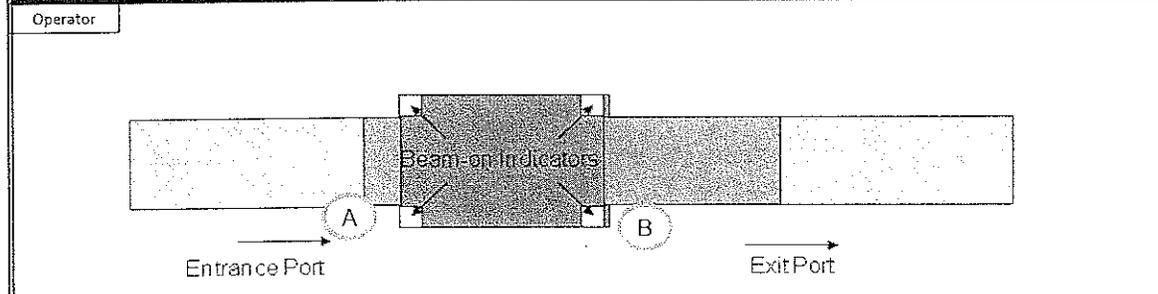
SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal C/AirTran C1S/Lane 1		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cat. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040AT	80801	Jan 2009
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date*	Not Found		

VISUAL INSPECTION			
Y	N	Requirement	Y N
<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"/> 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"/> Leaded drapes in good condition? <input checked="" type="checkbox"/> Interlocks not bypassed?
<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"/> Current User's Manual available? (21 CFR 1020.40(c)(9))
<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"/> Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	
<input checked="" type="checkbox"/>	<input 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 <sub>i</sub> )		Ambient Background <input type="checkbox"/> μR				
1	1.33 mR	$X_{avg} = 1.3 \text{ mR}$ $CV = 0.0608$ Coefficient of Variation (CV): $CV = (1/X_{avg})(\sum(X_i - X_{avg})^2 / (n-1))^{1/2}$	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	1.22 mR		a	0.00 μR	5.0 min	0.000 mR	PASS
3	1.22 mR		b	1.80 μR	5.0 min	0.022 mR	PASS
4	1.39 mR		c	μR	5.0 min	mR	
5	1.34 mR		d	μR	5.0 min	mR	
			e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

Second label indicates a manufacture date of March 2009.  
\*One light not working.

# Survey Worksheet - Cabinet X-Ray Systems

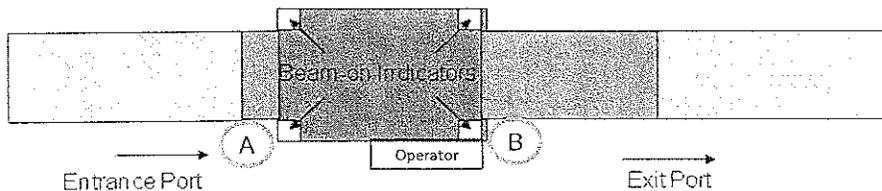
Health Physics Program  
U.S. Army Public Health Command (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal C/JetBlue C2S/Lane 4		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Smiths	6040AT	80804	Dec 2008
Instrument #2	Radcal	10XS-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Germany
Instrument #3	Radcal	10XS-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date*	Not Found		

VISUAL INSPECTION			
Y	N	Requirement	Y N
<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 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 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 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 checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))	<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 <sub>i</sub> )		Ambient Background <input type="checkbox"/> μR				
1	1.11 mR	$X_{avg} = 1.2$ mR $CV = 0.1677$	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	1.08 mR		a**	2.39 μR	5.0 min	0.029 mR	PASS
3	1.10 mR	Coefficient of Variation (CV): $CV = (1/X_{avg})(\sum(X_i - X_{avg})^2/(n-1))^{1/2}$	b*	2.38 μR	5.0 min	0.029 mR	PASS
4	1.17 mR		c	μR	5.0 min	mR	
5	1.56 mR		d	μR	5.0 min	mR	
			e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

Second label indicates a manufacture date of March 2009.

\*Slight detector bump during measurement.  
\*\* Slight cable bump during measurement.

# Survey Worksheet - Cabinet X-Ray Systems

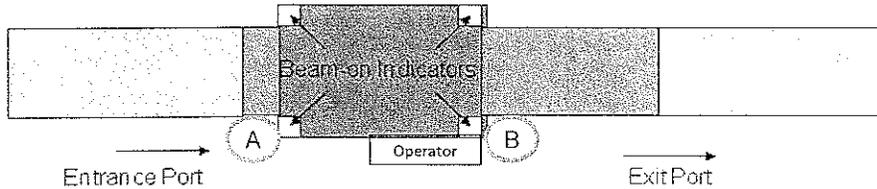
Health Physics Program  
U.S. Army Public Health Command (Provisional)  
Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA		SURVEY LOCATION			
Project No.	26-MF-TSAX-BOS-10	Location	Terminal B/US Air Main B/Lane 2		
Survey Date	19-23 Apr 2010	Organization	Boston's Logan International Airport		
Surveyor(s)	[REDACTED]	Street Address	2 Service Rd, 3rd Floor		
		City/Installation	East Boston	State	MA ZIP 02128

INSTRUMENTS USED					SYSTEM INFORMATION			
	Manufacturer	Model	Serial No.	Cal. Due	Manufacturer	Model	Serial No.	Manuf. Date
Instrument #1	Radcal	9010	90-3291	4 Mar 2011	Rapiscan	5220	7003007	Jul 2000
Instrument #2	Radcal	10X5-1800	10302	29 Jan 2011	Certified	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Place of Manufacture	Hawthorne, CA
Instrument #3	Radcal	10X5-180	5832	29 Jun 2010	Type	Checkpoint <input checked="" type="checkbox"/>	EDS: In-line <input type="checkbox"/> Stand-Alone <input type="checkbox"/>	
Instrument #4	WB Johnson	TVX-2000	40174	1 Jun 2010	Manufacturer Survey Date	3 Mar 2010		

VISUAL INSPECTION		Requirement		
Y	N	Y	N	
<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"/>	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"/>	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"/>	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"/>	Current User's Manual available? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Key Activated Control present? (21 CFR 1020.31(j))	<input checked="" type="checkbox"/>	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))
<input checked="" type="checkbox"/>	<input 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 <sub>i</sub> )		Ambient Background		μR		
1	0.41 mR	$CV = (1/X_{avg})(\sum(X_i - X_{avg})^2/(n-1))^{1/2}$	Location	Exposure	Time	Exposure in 1 hr	RESULT
2	0.43 mR		a	0.67 μR	5.0 min	0.008 mR	PASS
3	0.44 mR		b	0.33 μR	5.0 min	0.004 mR	PASS
4	0.43 mR		c	μR	5.0 min	mR	
5	0.43 mR		d	μR	5.0 min	mR	
			e	μR	5.0 min	mR	

### COMMENTS AND RECOMMENDATIONS

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

Calibration Report for Radcal Model 9010, SN 90-3291

**Enclosure 2**

## Certificate of Conformance

Issued to: USACHPPM  
5158 Black Hawk Rd., Bldg E2100  
APG-EA, MD 21010

Equipment Description	Model	S/N
Control Unit	9010	90-3291

The equipment identified above has been calibrated and tested using Radcal calibration and acceptance procedure A4500005, Radcal Quality Manual PP1007, Radcal Policy and Procedure PP1038, P11045, P11055 and other related documents. These procedures are designed to ensure that the tested equipment meets or exceeds Radcal's specifications and the requirements of ANSI/NCLS Z540-1-1994.

All measurements performed during the testing employ equipment traceable to NIST or another recognized National Laboratory such as Physikalisch-Technische Bundesanstalt (PTB).

For additional information please refer to Radcal's Product note: "The Importance of Conformance Testing". Radcal recommends revalidation in 12 months.

Certificate Issue Date: 04-Mar-10

By: 

Authorized Representative

426 W. Duarte Rd. Monrovia, CA 91016  
Tel: (626) 357-7921 FAX: (626) 357-8863 email: [service@radcal.com](mailto:service@radcal.com)

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