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

Transportation Security Administration

March 2, 2012

Mr. Robert Hansmeier
Acting Federal Security Director
Transportation Security Administration
Lihue International Airport (LIH)

Dear Mr. Hansmeier:

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

As part of the survey project, a radiation protection survey of selected general-use backscatter x-ray AIT and cabinet x-ray systems used at TSA Lihue Airport (LIH) was conducted on December 13-15, 2011, by a team of certified health physicists from USAPHC's Health Physics Program, Army Institute of Public Health. The purpose of the survey was to ensure that the general-use backscatter x-ray AIT systems comply with the requirements of the American National Standards Institute/ Health Physics Society (ANSI/HPS) N43.17-2009 standard, that the cabinet x-ray systems comply with the Food and Drug Administration's Performance Standards for Ionizing Radiation Emitting Products under Title 21, CFR, Subchapter J (Section 1020.40 Cabinet x-ray systems), and to identify any health hazards associated with the use of either of these x-ray systems.

General-use Backscatter X-ray AIT Systems

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

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

Cabinet X-ray Systems

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

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

The cabinet x-ray systems complied with other (non-emission) requirements of Title 21, CFR, Subchapter J, Section 1020.40, with the exception of (1) unavailability of user's manuals for all four of the Reveal CT-80 DR systems at the time of the survey, and (2) worn off mandatory warning labels on three of the four Reveal CT-80 DR systems. The affected systems are described in paragraphs (a) and (b) in the top half of page 2.

In addition, a couple of administrative items were identified for the cabinet x-ray systems, as noted in paragraphs (a) and (b) on the bottom half of page 2.

Your early attention to correcting the remaining uncorrected findings is requested. Please contact the TSA Service Response Center at 1-800-820-8535 for assistance, and advise me of progress via email by March 30, 2012, or when the corrections are completed, whichever is sooner.

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

Sincerely,

Jill M. Segraves

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

cc: Ms. Christine Halfacre, Chief of Staff, Office of Security Technology

Enclosure: TSA LIH Radiation Protection Survey Report, dated 6 February 2012

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

06 FEB 2012

Health Physics Program

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

Dear Ms. Segraves:

This letter is in reference to the Memorandum of Agreement between the U.S. Army Medical Command and the Transportation Security Administration (TSA), signed September 10, 2008; electronic mail message, subject: 2400.2.1 TSA Lihue Airport (LIH) Radiation Safety Surveys, 16 November 2011; American National Standards Institute/Health Physics Society (ANSI/HPS) N43.17-2009; and Title 21, Code of Federal Regulations (CFR), Subchapter J.

A radiation protection survey was performed on 13-15 December 2011 at LIH, Lihue, Kauai, HI, Project No. 26-MF-0FPJ-12. The survey was performed to:

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

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

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

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

The survey was performed by [redacted] Certified Health Physicist (CHP), Health Physics Program (HPP), Army Institute of Public Health (AIPH) and [redacted] CHP, HPP, AIPH. A total of one AIT x-ray system was evaluated for compliance with the requirements of ANSI/HPS N43.17-2009 and nine cabinet x-ray systems were evaluated for compliance with the requirements of Title 21, CFR, Subchapter J. The survey results for the AIT system is provided in Enclosure 1. The survey results for each cabinet x-ray system are provided in Enclosure 2.

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

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

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

a. At the time of the survey a user's manual was not available for the Reveal CT-80 DR.

b. The warning label "Caution: Do Not Insert Any Part of the Body When the System is Energized - X-Ray Hazard" was worn off at the entrance port of the following systems:

Model	Serial No.	Location
Reveal CT-80 DR	040759	United Pod
Reveal CT-80 DR	040758	Go! Pod
Reveal CT-80 DR	040757	Hawaiian Pod

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

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

b. For the Reveal CT-80 DR (SN: 040757, Hawaiian Pod), the entrance port leaded curtains were worn and the exit port leaded curtains were curled and not laying flat. The survey officers recommend the leaded curtains be replaced at both the entrance and exit ports.

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

The survey officers discussed the survey results with Ms. Sharlene Mata, Federal Security Director; Mr. Robert Hansmeier, Manager, Plans and Programs; Ms. Kim Ryan-Fernandez, Transportation Security Manager; and Mr. Dennis Erskine, Collateral Duty Safety Officer on 15 December 2011. A copy of the survey notes is provided in Enclosure 3.

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

Sincerely,

[redacted]

Portfolio Director
Occupational Health Sciences

Enclosures

Survey Results for One AIT X-Ray System

Encl 1

Survey Worksheet - AIT X-Ray Systems

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

SURVEY DATA

Project No.	26-MF-0FPJ-12
Survey Date	13 Dec 2011
Surveyor(s)	[redacted]

SURVEY LOCATION

Location	Checkpoint 1, AIT				
Organization	Lihue Airport				
Street Address	4280A Rice Street				
City/Installation	Lihue	State	HI	ZIP	96766

INSTRUMENTS USED

	Manufacturer	*Model*	*Serial No.*	*Cal. Due*
Instrument #1	Radcal	9010	90-3291	27 Jul 2012
Instrument #2	Radcal	10X5-1800	10299	27 Jul 2012
Instrument #3	WB Johnson	TVX-2000	40155	*

SYSTEM INFORMATION

Manufacturer	*Model*	*Serial No.*	*Manuf. Date*
Rapiscan	Secure 1000 SP	S50951006	Dec 2009

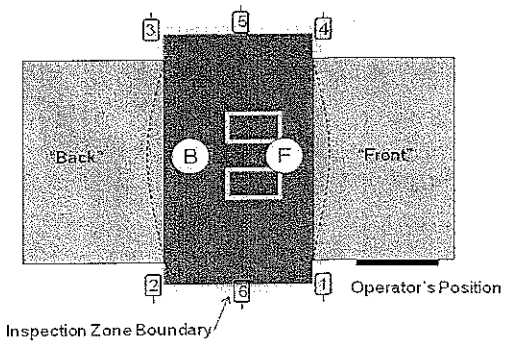
Certified	NA	*Place of Manufacture*	Torrance, CA
Service Provider Survey Date	4 Mar 2011		

VISUAL INSPECTION

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

NT=not tested; NA=not applicable.

SURVEY DIAGRAM



SCANNING MEASUREMENTS

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

Inspection zone boundary scanned with Instrument #3.

SCATTERED RADIATION (Optional)

Location	*Scan 1*	*Scan 2*	*Scan 3*	*Average*
#1	0.00 µR	0.00 µR	0.07 µR	0.02 µR
#2	0.13 µR	0.13 µR	0.13 µR	0.13 µR
#3	0.07 µR	0.00 µR	0.07 µR	0.05 µR
#4	0.20 µR	0.26 µR	0.25 µR	0.24 µR
#5	0.00 µR	#6	0.07 µR	

Measurements made with Instruments #1 & #2

DOSE PER SCREENING

	Exposure (X)	
Trial	*"Front" Side*	*"Back" Side*
a	6.16 µR	6.37 µR
b	6.29 µR	6.31 µR
c	6.18 µR	6.39 µR
d	6.25 µR	6.32 µR
e	6.12 µR	6.32 µR
AVG	6.20 µR	6.34 µR

Energy Correction Factor 1.25

Reference Effective Dose per Screening (max 25 µrem): 1.8 µrem or 0.018 µSv

RESULT PASS

Measurements made with Instruments #1 & #2

BEAM QUALITY

	Exposure (X)	
mm Al	*"Front" Side*	*"Back" Side*
0	2.66 µR	2.14 µR
0	2.66 µR	2.14 µR
1	1.36 µR	1.10 µR
1	1.30 µR	1.10 µR
1.5	1.04 µR	0.82 µR
1.5	1.04 µR	0.82 µR

HVL "Front" Side	1.0 mm Al
HVL "Back" Side	1.0 mm Al
Conversion Factor	0.115
Min. Filtration[1]	1.0 mm Al

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

RESULT PASS

Measurements made with Instruments #1 & #2

COMMENTS AND RECOMMENDATIONS

† User's manuals were not available at the time of the survey; however, they were provided at the exit brief on 15-Dec.

* Instrument #3 was response checked before and after the survey.

Survey Results for Nine Cabinet X-Ray Systems

Encl 2

Survey Worksheet - Cabinet X-Ray Systems

Health Physics Program

U.S. Army Public Health Command

Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA

Project No.	26-MF-0FPJ-12
Survey Date	14 Dec 2011
Surveyor(s)	[redacted]

SURVEY LOCATION

Location	Checkpoint 1, Lane 1				
Organization	Lihue Airport				
Street Address	4280A Rice Street				
City/Installation	Lihue	State	HI	ZIP	96766

INSTRUMENTS USED

	Manufacturer	*Model*	*Serial No.*	*Cal. Due*
Instrument #1	Radcal	9010	90-3291	27 Jul 2012
Instrument #2	Radcal	10X5-1800	10299	27 Jul 2012
Instrument #3	Radcal	10X5-180	18793	27 Jul 2012
Instrument #4	WB Johnson	TVX-2000	40155	*

SYSTEM INFORMATION

Manufacturer	*Model*	*Serial No.*	*Manuf. Date*
Rapiscan	620DV	7090604	Feb 2009

Certified Yes [X] No [ ] *Place of Manufacture* Torrance, CA

Type Checkpoint [X] EDS: In-line [ ] Stand-Alone [ ]

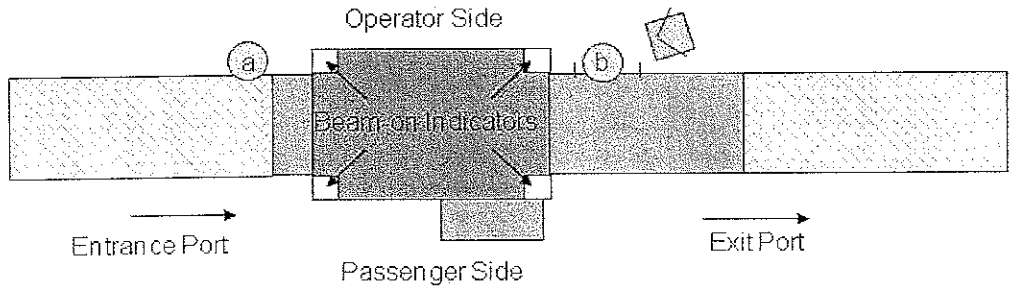
Manufacturer Survey Date 13 Jul 2011

VISUAL INSPECTION

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

NT=not tested; NA=not applicable.

SURVEY DIAGRAM



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

DOSE TO BAGGAGE

Trial	*Exposure (X_i)*	
1	0.7145	mR
2	0.7059	mR
3	0.7065	mR
4	0.7083	mR
5	0.7105	mR

X_{avg}	0.71	mR
CV	0.0049	

Coefficient of Variation (CV):

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

EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 µR

Location	*Exposure*		*Time*		*Exposure in 1 hr*		RESULT
a	4.56	µR	5.0	min	0.055	mR	PASS
b	3.14	µR	5.0	min	0.038	mR	PASS
c		µR		min		mR	
d		µR		min		mR	
e		µR		min		mR	

COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#2 combination.

Exposure outside cabinet measured with instrument #1/#2 combination.

† User's manuals were not available at the time of the survey; however, they were provided at the exit brief on 15-Dec.

Survey Worksheet - Cabinet X-Ray Systems

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

SURVEY DATA

Project No.	26-MF-0FPJ-12
Survey Date	14 Dec 2011
Surveyor(s)	[redacted]

SURVEY LOCATION

Location	Checkpoint 1, Lane 2				
Organization	Lihue Airport				
Street Address	4280A Rice Street				
City/Installation	Lihue	State	HI	ZIP	96766

INSTRUMENTS USED

	Manufacturer	*Model*	*Serial No.*	*Cal. Due*
Instrument #1	Radcal	9010	90-3291	27 Jul 2012
Instrument #2	Radcal	10X5-1800	10299	27 Jul 2012
Instrument #3	Radcal	10X5-180	18793	27 Jul 2012
Instrument #4	WB Johnson	TVX-2000	40155	*

SYSTEM INFORMATION

Manufacturer	*Model*	*Serial No.*	*Manuf. Date*
Rapiscan	620DV	7090606	Feb 2009

Certified Yes [X] No [ ] *Place of Manufacture* Torrance, CA

Type Checkpoint [X] EDS: In-line [ ] Stand-Alone [ ]

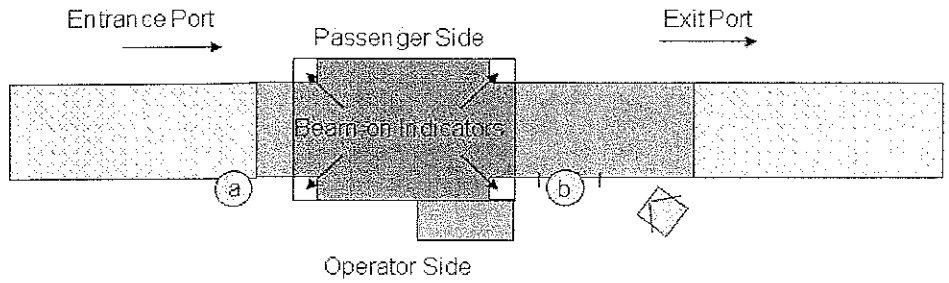
Manufacturer Survey Date 12 Jul 2011

VISUAL INSPECTION

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

NT=not tested; NA=not applicable.

SURVEY DIAGRAM



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

DOSE TO BAGGAGE

Trial	*Exposure (X_i)*	
1	0.5036	mR
2	0.5135	mR
3	0.5156	mR
4	0.5213	mR
5	0.5131	mR

X_{avg}	0.51	mR
CV	0.0124	

Coefficient of Variation (CV):

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

EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 µR

Location	*Exposure*		*Time*		*Exposure in 1 hr*		RESULT
a	3.34	µR	5.0	min	0.040	mR	PASS
b	3.21	µR	5.0	min	0.039	mR	PASS
c		µR		min		mR	
d		µR		min		mR	
e		µR		min		mR	

COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#2 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
† User's manuals were not available at the time of the survey; however, they were provided at the exit brief on 15-Dec.

Survey Worksheet - Cabinet X-Ray Systems

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

SURVEY DATA

Project No.	26-MF-0FPJ-12
Survey Date	14 Dec 2011
Surveyor(s)	[redacted]

SURVEY LOCATION

Location	Checkpoint 1, Lane 3				
Organization	Lihue Airport				
Street Address	4280A Rice Street				
City/Installation	Lihue	State	HI	ZIP	96766

INSTRUMENTS USED

	Manufacturer	*Model*	*Serial No.*	*Cal. Due*
Instrument #1	Radcal	9010	90-3291	27 Jul 2012
Instrument #2	Radcal	10X5-1800	10299	27 Jul 2012
Instrument #3	Radcal	10X5-180	18793	27 Jul 2012
Instrument #4	WB Johnson	TVX-2000	40155	*

SYSTEM INFORMATION

Manufacturer	*Model*	*Serial No.*	*Manuf. Date*
Rapiscan	620DV	7090209	Jan 2009

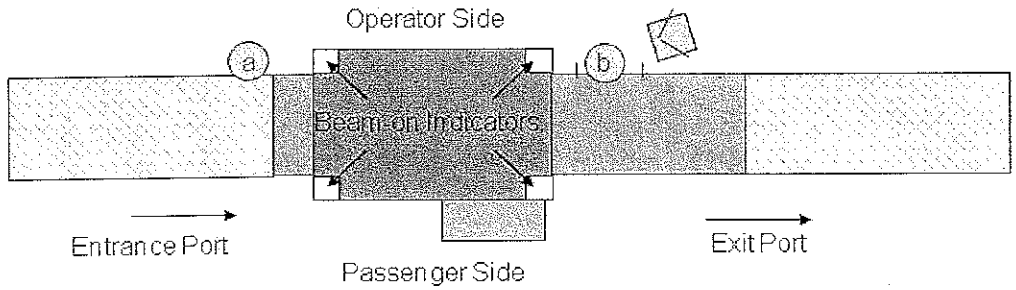
Certified	Yes	X	No	*Place of Manufacture*	Torrance, CA		
Type	Checkpoint	X	EDS:	In-line		Stand-Alone	
Manufacturer Survey Date	29 Jul 2011						

VISUAL INSPECTION

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

NT=not tested; NA=not applicable.

SURVEY DIAGRAM



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

DOSE TO BAGGAGE

Trial	*Exposure (X_i)*	
1	1.317	mR
2	0.6042	mR
3	0.6768	mR
4	0.5874	mR
5	0.5786	mR

X_{avg}	0.75	mR
CV	0.4221	

Coefficient of Variation (CV):

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

EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 µR

Location	*Exposure*		*Time*		*Exposure in 1 hr*		RESULT
a	3.41	µR	5.0	min	0.041	mR	PASS
b	4.20	µR	5.0	min	0.050	mR	PASS
c		µR		min		mR	
d		µR		min		mR	
e		µR		min		mR	

COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#2 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
† User's manuals were not available at the time of the survey; however, they were provided at the exit brief on 15-Dec.

Survey Worksheet - Cabinet X-Ray Systems

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

SURVEY DATA

Project No.	26-MF-0FPJ-12
Survey Date	14 Dec 2011
Surveyor(s)	[redacted]

SURVEY LOCATION

Location	Checkpoint 2				
Organization	Lihue Airport				
Street Address	4280A Rice Street				
City/Installation	Lihue	State	HI	ZIP	96766

INSTRUMENTS USED

	Manufacturer	*Model*	*Serial No.*	*Cal. Due*
Instrument #1	Radcal	9010	90-3291	27 Jul 2012
Instrument #2	Radcal	10X5-1800	10299	27 Jul 2012
Instrument #3	Radcal	10X5-180	18793	27 Jul 2012
Instrument #4	WB Johnson	TVX-2000	40155	*

SYSTEM INFORMATION

Manufacturer	*Model*	*Serial No.*	*Manuf. Date*
Rapiscan	620DV	7090507	Feb 2009

Certified	Yes	X	No		*Place of Manufacture*	Torrance, CA		
Type	Checkpoint	X	EDS:	In-line		Stand-Alone		
Manufacturer Survey Date	13 Oct 2011							

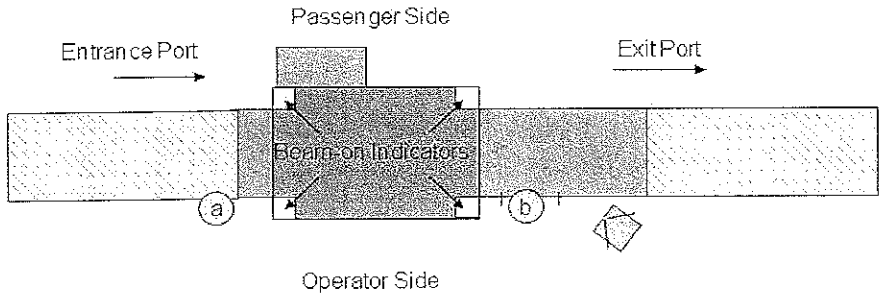
VISUAL INSPECTION

Y	N	*Requirement*
X		Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i))
X		Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? (21 CFR 1020.40(c)(8)(ii))
X		Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii))
X		One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv))
X		Key Activated Control present? (21 CFR 1020.40(c)(6)(i))
X		Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))

Y	N	*Requirement*
X		Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii))
X		Leaded drapes in good condition?
X		Interlocks not bypassed?
†		Current User's Manual available? (21 CFR 1020.40(c)(9))
X		Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))

NT=not tested; NA=not applicable.

SURVEY DIAGRAM



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

DOSE TO BAGGAGE

Trial	*Exposure (X_i)*	
1	0.5357	mR
2	0.5426	mR
3	0.5376	mR
4	0.5442	mR
5	0.5435	mR

X_{avg}	0.54	mR
CV	0.0071	

Coefficient of Variation (CV):

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

EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 μR

Location	*Exposure*		*Time*		*Exposure in 1 hr*		RESULT
a*	11.77	μR	5.0	min	0.141	mR	PASS
b	2.94	μR	5.0	min	0.035	mR	PASS
c		μR		min		mR	
d		μR		min		mR	
e		μR		min		mR	

COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#2 combination.
Exposure outside cabinet measured with instrument #1/#2 combination. Empty bins were screened to make the measurement.
† User's manuals were not available at the time of the survey; however, they were provided at the exit brief on 15-Dec.
* Instrument was bumped several times during measurement.

Survey Worksheet - Cabinet X-Ray Systems

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

SURVEY DATA

Project No.	26-MF-0FPJ-12
Survey Date	14 Dec 2011
Surveyor(s)	[redacted]

SURVEY LOCATION

Location	Checkpoint 3				
Organization	Lihue Airport				
Street Address	4280A Rice Street				
City/Installation	Lihue	State	HI	ZIP	96766

INSTRUMENTS USED

	Manufacturer	*Model*	*Serial No.*	*Cal. Due*
Instrument #1	Radcal	9010	90-3291	27 Jul 2012
Instrument #2	Radcal	10X5-1800	10299	27 Jul 2012
Instrument #3	Radcal	10X5-180	18793	27 Jul 2012
Instrument #4	WB Johnson	TVX-2000	40155	*

SYSTEM INFORMATION

Manufacturer	*Model*	*Serial No.*	*Manuf. Date*
Rapiscan	620DV	7082608	Jul 2008

Certified	Yes X	No	*Place of Manufacture*	Torrance, CA			
Type	Checkpoint X	EDS:	In-line		Stand-Alone		
Manufacturer Survey Date	11 Jul 2011						

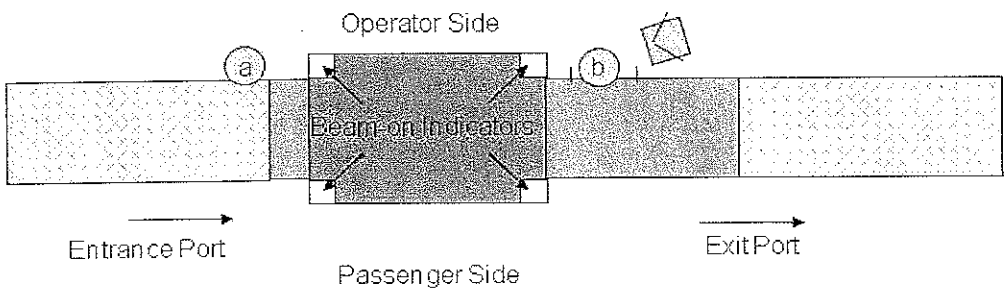
VISUAL INSPECTION

Y	N	*Requirement*
X		Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i))
X		Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? (21 CFR 1020.40(c)(8)(ii))
X		Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii))
X		One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv))
X		Key Activated Control present? (21 CFR 1020.40(c)(6)(i))
X		Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))

Y	N	*Requirement*
X		Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii))
X		Leaded drapes in good condition?
X		Interlocks not bypassed?
†		Current User's Manual available? (21 CFR 1020.40(c)(9))
X		Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))

NT=not tested; NA=not applicable.

SURVEY DIAGRAM



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

DOSE TO BAGGAGE

Trial	*Exposure (X_i)*	
1	0.6036	mR
2	0.5969	mR
3	0.6216	mR
4	0.6229	mR
5	0.6048	mR

X_{avg}	0.61	mR
CV	0.0191	

Coefficient of Variation (CV):

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

EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 μR

Location	*Exposure*		*Time*		*Exposure in 1 hr*		RESULT
a	6.16	μR	5.0	min	0.074	mR	PASS
b	7.27	μR	5.0	min	0.087	mR	PASS
c		μR		min		mR	
d		μR		min		mR	
e		μR		min		mR	

COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#2 combination.
Exposure outside cabinet measured with instrument #1/#2 combination. Empty bins were screened to make the measurement.
† User's manuals were not available at the time of the survey; however, they were provided at the exit brief on 15-Dec.

Survey Worksheet - Cabinet X-Ray Systems

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

SURVEY DATA

Project No.	26-MF-0FPJ-12
Survey Date	14 Dec 2011
Surveyor(s)	[redacted]

SURVEY LOCATION

Location	United Pod				
Organization	Lihue Airport				
Street Address	4280A Rice Street				
City/Installation	Lihue	State	HI	ZIP	96766

INSTRUMENTS USED

	Manufacturer	*Model*	*Serial No.*	*Cal. Due*
Instrument #1	Radcal	9010	90-3291	27 Jul 2012
Instrument #2	Radcal	10X5-1800	10299	27 Jul 2012
Instrument #3	Radcal	10X5-180	18793	27 Jul 2012
Instrument #4	WB Johnson	TVX-2000	40155	*

SYSTEM INFORMATION

Manufacturer	*Model*	*Serial No.*	*Manuf. Date*
Reveal	CT-80 DR	040759	Apr 2010

Certified Yes X No | *Place of Manufacture* Bedford, MA

Type Checkpoint | EDS: In-line | Stand-Alone X

Manufacturer Survey Date none found ‡

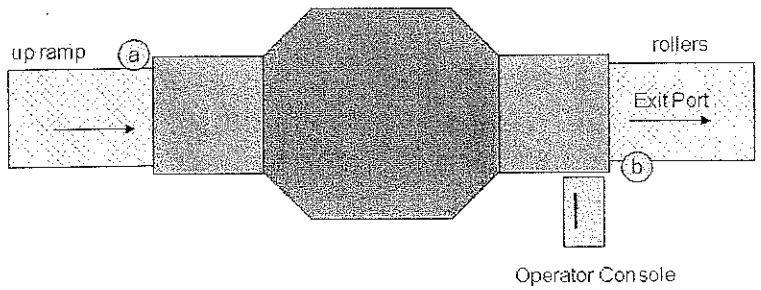
VISUAL INSPECTION

Y	N	*Requirement*
X		Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i))
	X	Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? Worn off from entrance port. (21 CFR 1020.40(c)(8)(ii))
X		Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii))
X		One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv))
X		Key Activated Control present? (21 CFR 1020.40(c)(6)(i))
NA		Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))

Y	N	*Requirement*
X		Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii))
X		Leaded drapes in good condition?
X		Interlocks not bypassed?
	†	Current User's Manual available? (21 CFR 1020.40(c)(9))
	‡	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))

NT=not tested; NA=not applicable.

SURVEY DIAGRAM



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

DOSE TO BAGGAGE

Trial	*Exposure (X_i)*	
1	33.00	mR
2	32.91	mR
3	33.94	mR
4	26.52	mR
5	26.96	mR

X_{avg}	30.7	mR
CV	0.1177	

Coefficient of Variation (CV):

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

EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 μR

Location	*Exposure*		*Time*		*Exposure in 1 hr*		RESULT
a	8.33	μR	5.0	min	0.100	mR	PASS
b	3.02	μR	5.0	min	0.036	mR	PASS
c		μR		min		mR	
d		μR		min		mR	
e		μR		min		mR	

COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#3 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
† User's manuals were not available at the time of the survey.
‡ Unable to be determined at the time of the survey because a service provider's survey date was not found on the system.

Survey Worksheet - Cabinet X-Ray Systems

Health Physics Program

U.S. Army Public Health Command

Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA

Project No.	26-MF-0FPJ-12
Survey Date	14 Dec 2011
Surveyor(s)	[redacted]

SURVEY LOCATION

Location	Go! Pod				
Organization	Lihue Airport				
Street Address	4280A Rice Street				
City/Installation	Lihue	State	HI	ZIP	96766

INSTRUMENTS USED

	Manufacturer	Model	Serial No.	Cal. Due
Instrument #1	Radcal	9010	90-3291	27 Jul 2012
Instrument #2	Radcal	10X5-1800	10299	27 Jul 2012
Instrument #3	Radcal	10X5-180	18793	27 Jul 2012
Instrument #4	WB Johnson	TVX-2000	40155	*

SYSTEM INFORMATION

Manufacturer	Model	Serial No.	Manuf. Date
Reveal	CT-80 DR	040758	Apr 2010

Certified	Yes	X	No		*Place of Manufacture*	Bedford, MA			
Type	Checkpoint		EDS:	In-line		Stand-Alone	X		
Manufacturer Survey Date	none found ‡								

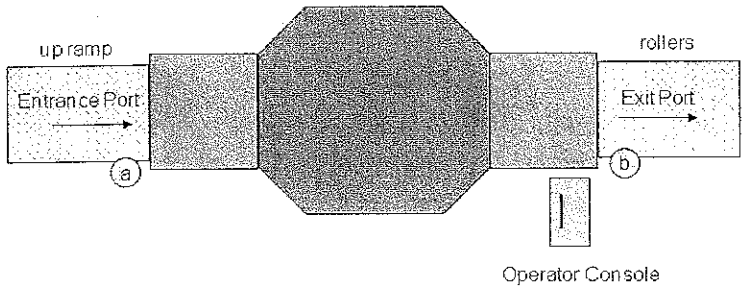
VISUAL INSPECTION

Y	N	Requirement
X		Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i))
	X	Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? Worn off from entrance port. (21 CFR 1020.40(c)(8)(ii))
X		Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii))
X		One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv))
X		Key Activated Control present? (21 CFR 1020.40(c)(6)(i))
NA		Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))

Y	N	Requirement
X		Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii))
X		Leaded drapes in good condition?
X		Interlocks not bypassed?
	†	Current User's Manual available? (21 CFR 1020.40(c)(9))
	‡	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))

NT=not tested; NA=not applicable.

SURVEY DIAGRAM



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

DOSE TO BAGGAGE

Trial	Exposure (X_i)	
1	26.72	mR
2	33.99	mR
3	34.31	mR
4	26.81	mR
5	26.62	mR

X_{avg}	29.7	mR
CV	0.1372	

Coefficient of Variation (CV):

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

EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 μR

Location	Exposure		Time		Exposure in 1 hr		RESULT
a	21.82	μR	5.0	min	0.262	mR	PASS
b	6.79	μR	5.0	min	0.081	mR	PASS
c		μR		min		mR	
d		μR		min		mR	
e		μR		min		mR	

COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#3 combination.

Exposure outside cabinet measured with instrument #1/#2 combination.

† User's manuals were not available at the time of the survey.

‡ Unable to be determined at the time of the survey because a service provider's survey date was not found on the system.

Survey Worksheet - Cabinet X-Ray Systems

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

SURVEY DATA

Project No.	26-MF-0FPJ-12
Survey Date	14 Dec 2011
Surveyor(s)	[redacted]

SURVEY LOCATION

Location	Hawaiian Pod				
Organization	Lihue Airport				
Street Address	4280A Rice Street				
City/Installation	Lihue	State	HI	ZIP	96766

INSTRUMENTS USED

	Manufacturer	*Model*	*Serial No.*	*Cal. Due*
Instrument #1	Radcal	9010	90-3291	27 Jul 2012
Instrument #2	Radcal	10X5-1800	10299	27 Jul 2012
Instrument #3	Radcal	10X5-180	18793	27 Jul 2012
Instrument #4	WB Johnson	TVX-2000	40155	*

SYSTEM INFORMATION

Manufacturer	*Model*	*Serial No.*	*Manuf. Date*
Reveal	CT-80 DR	040757	Apr 2010

Certified Yes [X] No [ ] *Place of Manufacture* Bedford, MA

Type Checkpoint [ ] EDS: In-line [ ] Stand-Alone [X]

Manufacturer Survey Date none found ‡

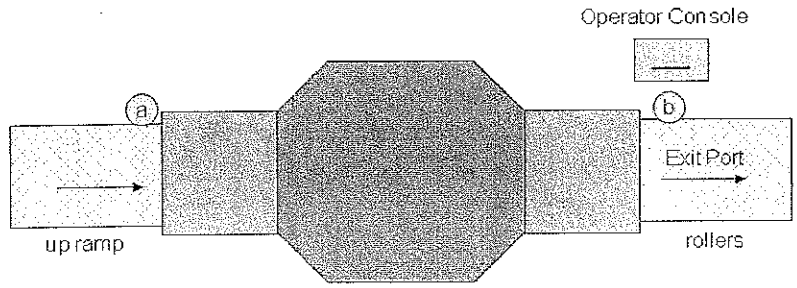
VISUAL INSPECTION

Y	N	*Requirement*
X		Warning label "Caution: X-Rays Produced When Energized" present at control panel? (21 CFR 1020.40(c)(8)(i))
	X	Warning label "Caution: Do Not Insert Any Part of the Body When System Is Energized - X-Ray Hazard" present at each port? Worn off from entrance port. (21 CFR 1020.40(c)(8)(ii))
X		Two independent "x-ray on" indicators visible from control panel? (21 CFR 1020.40(c)(6)(iii))
X		One "x-ray on" indicator visible from each port and access panel? (21 CFR 1020.40(c)(6)(iv))
X		Key Activated Control present? (21 CFR 1020.40(c)(6)(i))
NA		Means to require operator presence at control panel? (21 CFR 1020.40(c)(10))

Y	N	*Requirement*
X		Means to initiate and terminate x-ray generation? (21 CFR 1020.40(c)(6)(ii); 1020.40(c)(10)(i) or (ii))
	X	Leaded drapes in good condition? Entrance worn and exit curled.
X		Interlocks not bypassed?
	†	Current User's Manual available? (21 CFR 1020.40(c)(9))
	‡	Maintenance performed according to recommended schedule? (21 CFR 1020.40(c)(9))

NT=not tested; NA=not applicable.

SURVEY DIAGRAM



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

DOSE TO BAGGAGE

Trial	*Exposure (X_i)*	
1	25.07	mR
2	31.39	mR
3	25.13	mR
4	30.93	mR
5	25.25	mR

X_{avg}	27.6	mR
CV	0.1196	

Coefficient of Variation (CV):

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

EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 μR

Location	*Exposure*		*Time*		*Exposure in 1 hr*		RESULT
a	20.81	μR	5.0	min	0.250	mR	PASS
b	10.31	μR	5.0	min	0.124	mR	PASS
c		μR		min		mR	
d		μR		min		mR	
e		μR		min		mR	

COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#3 combination.
Exposure outside cabinet measured with instrument #1/#2 combination.
† User's manuals were not available at the time of the survey.
‡ Unable to be determined at the time of the survey because a service provider's survey date was not found on the system.

Survey Worksheet - Cabinet X-Ray Systems

Health Physics Program

U.S. Army Public Health Command

Aberdeen Proving Ground, Maryland 21010-5403

SURVEY DATA

Project No.	26-MF-0FPJ-12
Survey Date	14 Dec 2011
Surveyor(s)	[redacted]

SURVEY LOCATION

Location	American/Island Air Pod				
Organization	Lihue Airport				
Street Address	4280A Rice Street				
City/Installation	Lihue	State	HI	ZIP	96766

INSTRUMENTS USED

	Manufacturer	*Model*	*Serial No.*	*Cal. Due*
Instrument #1	Radcal	9010	90-3291	27 Jul 2012
Instrument #2	Radcal	10X5-1800	10299	27 Jul 2012
Instrument #3	Radcal	10X5-180	18793	27 Jul 2012
Instrument #4	WB Johnson	TVX-2000	40155	*

SYSTEM INFORMATION

Manufacturer	*Model*	*Serial No.*	*Manuf. Date*
Reveal	CT-80 DR	040756	Apr 2010

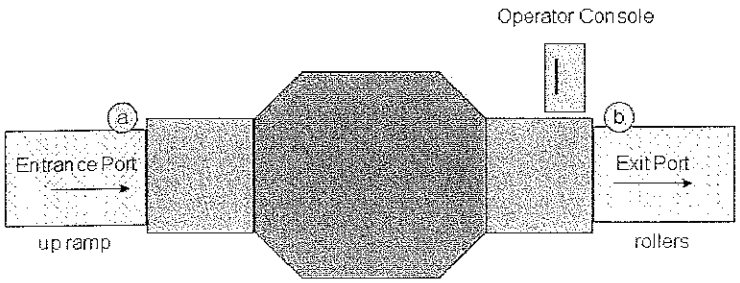
Certified	Yes	X	No		*Place of Manufacture*	Bedford, MA			
Type	Checkpoint		EDS:	In-line		Stand-Alone	X		
Manufacturer Survey Date	none found ‡								

VISUAL INSPECTION

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

NT=not tested; NA=not applicable.

SURVEY DIAGRAM



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

DOSE TO BAGGAGE

Trial	*Exposure (X_i)*	
1	37.85	mR
2	25.79	mR
3	32.49	mR
4	25.56	mR
5	31.16	mR

X_{avg}	30.6	mR
CV	0.1676	

Coefficient of Variation (CV):

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

EXPOSURE OUTSIDE CABINET

Ambient Background 0.00 μR

Location	*Exposure*		*Time*		*Exposure in 1 hr*		RESULT
a	1.52	μR	2.0	min	0.046	mR	PASS
b	4.42	μR	5.0	min	0.053	mR	PASS
c		μR		min		mR	
d		μR		min		mR	
e		μR		min		mR	

COMMENTS AND RECOMMENDATIONS

Dose to baggage measured with instrument #1/#3 combination.

Exposure outside cabinet measured with instrument #1/#2 combination.

† User's manuals were not available at the time of the survey.

‡ Unable to be determined at the time of the survey because a service provider's survey date was not found on the system.

Survey Notes Provided on 15 December 2011

Encl 3

MCHB-IP-OHP 15 December 2011

Exit Briefing Notes

1. Project Information.

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

   b. Survey dates: 13-14 December 2011

   c. Lihue Airport (LIH), Lihue, Kauai, Hawaii

   d. Survey Officer(s): [redacted]

2. Background Information.

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

   b. Airport Contact: Robert Hansmeier, Manager, Plans and Programs, Phone: [redacted]

   c. Individuals Assisting the Survey Team:

Name	Title/Position
Pua Medeiros	TSM
Kim Ryan-Fernandez	STSM/BDO
Doris Williams	LTSO

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

Model	Serial No.	Location
Rapiscan Secure 1000 SP	S50951006	Checkpoint 1, AIT

   e. Cabinet X-Ray Systems Surveyed:

Model	Serial No.	Location
Rapiscan 620DV	7090604	Checkpoint 1, Lane 1
Rapiscan 620DV	7090606	Checkpoint 1, Lane 2
Rapiscan 620DV	7090209	Checkpoint 1, Lane 3
Rapiscan 620DV	7090507	Checkpoint 2
Rapiscan 620DV	7082608	Checkpoint 3
Reveal CT-80 DR	040759	United Pod
Reveal CT-80 DR	040758	Go! Pod
Reveal CT-80 DR	040757	Hawaiian Pod
Reveal CT-80 DR	040756	American/Island Air Pod

3. Findings and Recommendations.

a. AIT (Backscatter X-Ray) Systems.

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

(2) The system surveyed was found to be in compliance with the other requirements of ANSI/HPS N43.17-2009, with the following exception: A user's manual was not available at the time of the survey.

b. Cabinet X-ray Systems.

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

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

(a) At the time of the survey, user's manuals were not available for the Rapiscan 620DV and the Reveal CT-80 DR.

(b) The warning label "Caution: Do Not Insert Any Part of the Body When the System is Energized - X-Ray Hazard" was worn off at the entrance port the following systems:

Model	Serial No.	Location
Reveal CT-80 DR	040759	United Pod
Reveal CT-80 DR	040758	Go! Pod
Reveal CT-80 DR	040757	Hawaiian Pod

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

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

(b) For the Reveal CT-80 DR (SN: 040757, Hawaiian Pod), the entrance port leaded curtains were worn and the exit port leaded curtains were curled and not laying flat. Recommend the curtains be replaced on this system.

c. Based on dosimetry and field measurements around the Secure 1000 SP and cabinet x-ray systems, it is estimated that TSOs will receive a radiation dose of less

than 10 millirem in a year. For comparison, the occupational limit under Occupational Safety and Health Administration regulations is 1,250 millirem per quarter (5,000 millirem per year) and the goal of the TSA radiation safety program is to keep all radiation doses less than 100 millirem per year.