# Testing and Evaluation Protocol for Spectroscopy-Based Portal Monitors Used for Homeland Security

T&E Protocol N42.38, 2010

Version 1.02

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### **Testing and Evaluation Protocol for** Spectroscopy-Based Portal Monitors Used for Homeland Security

#### 1. Scope

This document establishes the protocol for testing alarming personal radiation detectors based on the performance requirements established in ANSI N42.38, "American National Standard for Evaluation and Performance of Radiation Detection Portal for Use in Homeland Security."

### **2.** References

This protocol shall be used in conjunction with the following documents:

[R1] ANSI N42.38, "American National Standard for Evaluation and Performance of Radiation Detection Portal for Use in Homeland Security."

[R2] ANSI/IEEE N42.42, "Data Format Standard for Radiation Detectors Used for Homeland Security."

[R3] NIST Handbook 150:2006, NVLAP Procedures and General Requirements

[R4] NIST Handbook 150-23:2007 (DRAFT) NVLAP Radiation Detection Instruments

## **3.** Compliance Level Information

Instrument under test might meet all the requirements listed in the ANSI/IEEE N42.38 standard. Therefore, different agencies developed documents describing the compliance levels required for particular applications of the instruments under test. Examples of such compliance level requirements are those required by the Graduated Rad/Nuc Detector Evaluation and Reporting (GRaDER<sup>SM</sup>) program. For this program, information can be found in the "Compliance Level for GRaDER Instrument Performance" document located at <a href="http://www.dhs.gov/GRaDER">http://www.dhs.gov/GRaDER</a>.

#### **4.** Test and evaluation steps

It is recommended that testing laboratories perform the tests listed in this protocol in the following order:

- Check all items listed in the general requirements
- Perform the radiological tests
- Perform the temperature and humidity tests
- Perform the entire electrical and electromagnetic test except the Electrostatic Discharge (ESD) test
- Perform the impact and the vibration tests
- Perform the moisture and dust test
- Perform the ESD test
- Perform the drop test, as required

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Excel template sheets are provided by NIST to the testing laboratory to guarantee that all data required is being provided in the test report.

## **5.** Recording test results

This Test and Evaluation protocol contains data sheets that shall be used to record and report all test results. Each data sheet is associated with a specific section(s) of the referenced ANSI standard, N42.38. An electronic version of the data sheets is provided in the form of spreadsheets that may be used to record and report the results of the tests. These spreadsheets were verified and validated (V&V) using Microsoft Excel 2007 (compatibility mode).

Instrument status shall be recorded on the "Test Summary" sheet as testing is performed. The comment section in each data sheet shall be used to record changes to the test requirements and methods listed in the ANSI standard. The comment section shall also include the rational of the changes.

## 6. Test report

A test report summarizing the results of the test shall include the following sections:

- a. Laboratory equipment information:
  - 1. Identify all participating laboratory facilities. Include points of contact names, mailing address, telephone number, and electronic mail addresses.
  - 2. Identify the tests performed in the different facilities.
  - 3. List all supporting equipment name, model number and last day of calibration used for each test.
- b. Test equipment information :
  - 1. Include manufacturer name, instrument model, instrument serial number, software and firmware version identification, and last day of calibration.
  - 2. List the operating modes and parameter setting of the instrument and accessory kit(s) used in each test.
- c. Data sheets:
  - 1. The data sheets listed in this document shall be completed and provided as part of the report.
  - 2. Include changes to the ANSI standard test requirements or methods and rational to the changes.

## 7. Guidance for testing ANSI N42.42 data format requirements

The standard associated with this Test and Evaluation Protocol requires verification that an output data file is created that complies with ANSI/IEEE N42.42 standard requirements. The range of

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complexity of the N42.42 compliant instrument output file is extremely broad. Data output files from these instruments are simple files that can be checked manually using a text editor such as Notepad or WordPad. These files can also be verified using additional tools. In principle, all data output files that meet ANSI N42.42 can be verified manually using a text editor as these files are XML files. File reading software, such as Altova XMLSpy® 2009 Standard Edition can also be used for manual viewing and validating of structure and content.

N42.42 schemas can be used to validate the file format as specified in the ANSI/IEEE N42.42 standard. These schemas are available at the NIST web site <a href="http://physics.nist.gov/Divisions/Div846/Gp4/ANSIN4242/xml.html">http://physics.nist.gov/Divisions/Div846/Gp4/ANSIN4242/xml.html</a>.

There are several XML validators that can be used to verify the XML structure of the N42.42 compliant instrument output file. Examples of these validators can be found at <u>http://www.xmlvalidation.com/</u> or http://validator.w3.org/.

#### 8. Test modifications from ANSI/IEEE N42.38-2006 requirements

Some issues were observed and new considerations were taken about the enrichment of some of the sources listed in the ANSI/IEEE N42.38 standard. The testing laboratories should note that the source enrichment to be used for all the tests described in the ANSI/IEEE N42.38 standard is the following: HEU has an enrichment that is  $\geq 90\%^{235}$ U, DU at 0.2%  $^{235}$ U, and U<sub>nat</sub> at 0.7%  $^{235}$ U, RGPu containing  $\geq 10\%^{240}$ Pu, and WGPu  $\leq 6\%^{240}$ Pu.

#### 9. Considerations

The standard establishes exposure rates for test in Roentgen per hour (R/h). When testing instruments that read in rem per hour, the test field shall be in rem/h instead of R/h. Refer to the "Units and Uncertainties" section in the standard for additional information.



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Test Summary Sheet									
		A	NSI N42.38						
Manufacturer:									
Model:									
	Sorial#		Sarial#		Sorial#				
Test Number	Date	Status	Date	Status	Date	Status			
5 3	Dute	510105	Dute	Status	Date	510105			
5.4									
5.5									
5.6									
5.7									
5.8									
5.9									
5.10									
5.11.2.1									
5.11.2.2									
5.11.2.3									
5.11.2.4									
6.2									
6.3									
6.4									
6.5									
6.7									
6.8.1									
6.8.2.2									
6.8.2.3									
6.8.3									
6.8.4									
6.8.5									
6.8.6									
6.10									
7.1									
7.2									
7.3									
8.1									
8.2									
8.3									
8.4									
0.5 8.6									
9.1									
9.2									
10.0									
Comments:									
		1	1	1	1				



				Setup					
		Data	Sh	eet and	Report				
Instrument:									
Model:						Seria	I Number:		
Date Performed:						Test	Location:		
Requirement:	Following the manufacturer-provided information, it shall be possible to set up the monitor for use. The manufacturer shall provide the designation type for testing purposes (pedestrian, vehicle, rail, and/or package).								
	The evaluat natural bac NOTE - If th	The evaluation shall be performed without the benefit of any radiation shielding against the natural background, except for that shielding which is a permanent feature of the monitor. NOTE - If the monitor has multiple uses, it should be tested for each usage designation.							
Test Protocol:	Set up the monitor for use using the technical manual as a guide. The actual set-up process may be performed by the manufacturer at the usage or test location while being observed by the testing organization. Document the results indicating whether all steps and information needed are available in the supplied technical information.								
Note:	Comments	are require	ed whe	n the require	ment is not	verifie	d.		
			Т	est Results					
Classification:	(choos	e one)		Pedestrian Vehicle			Package Rail		
Setup performed by:	(choos	e one)		Manufactur	er		Test Organ	nization	
Were all steps for setup	clearly def	ined?	H	Yes			No		
Was it necessary to se assistance from the ma	ek technica nufacturer?	l	LJ	Yes		Ц	No		
Did the technical manual necessary for setup?	al provide al	l steps	L	Yes		Ц	No		
Was all information nec (diagrams, schematics, technical manual?	essary for s etc.) provic	setup led in the	ч	Yes		IJ	No		
Comments:									
Completed by:							Date:		
Reviewed by:							Date		
itevieweu by.							Dale.		



		Pro	e-Test					
	Da	ata She	et and F	Report				
			otunu i	oport				
lu cóm na cut								
Instrument:				Pori	. Numbori			
Date Parformed:				Tos	t Location:			
Date Performed.				Tes	Location.			
Poquiromont	Verify that f	the manufact	turer sunnlie	d an onera	tion and mai	ntenance m	anual	
Kequitement.	containing	the informat	tion listed be	low.			andun	
	Gontaining							
Test Protocol:	Review th	e information	n nrovided a	nd indicate	whether the	e required in	oforma	ation
	has been	nrovided A	lso verify th	at the doci	mentation i	s complete	and	
	understan	dahle The	documentat	tion should	not he in dr	aft form wit	h	
	incomplet	e sections	accumenta					
	moompior							
Note:	Comment	s are require	d when the r	equiremen	t is not verifie	ed.	I	
		Tes	st Results					
	Require	ment			Yes		N	0
	rtoquiro	inone			100			•
Operating instructions and	restrictions	:			11			1
Electrical connection scher	natic							
Spare parts list								
Troubleshooting guide.								
Description and protocol for	· communic	cation metho	ods of transi	mitting and				
receiving data				<b>J</b>			╎┕	,-d
Contact information for the	manufactur	er including	name, addi	ress,				
telephone #, fax #, email ac	dress, etc	. 0	,				╎┕	
Power supply requirements							1	Ι
Recommended operational	parameters	s such as: d	letector resp	oonse and				
false alarm probability							╎┖	_
Complete description of sys	stem or uni	t					L	
Enclosure specification class	ssification						Ē	
Inclusion of any hazardous	material th	at may requ	ire additiona	al				_
regulation							╎┖	_
Description of data analysis	software a	and radionuo	clide identifie	cation	11			
procedure							╎┕	
Description of operation and	d performar	nce of the sy	stem or un	it				I
							╘	~
Comments:								
Completed by:				· · · · ·	Date:			
Reviewed by:					Date:			



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## Section 5.3 Spectral identification **Data Sheet and Report** Instrument: Model: Serial Number: **Date Performed: Test Location:** Requirement: a) A displayed gamma-ray spectrum is not required during routine operation. The spectrum display shall be available by manufacturer-defined user actions. b) The monitor shall have the ability to internally store at least 1000 complete occupancy data sets. For monitors that do not use occupancy sensors, the monitor shall have the ability to store 3 hours of measurement data as defined in item c). c) Each occupancy data set shall contain collection and identification results information including: 1) Unprocessed spectrum (spectra for multi-detector systems) obtained during a single occupancy, 2) Time and date 3) Real time for alarm spectrum 4) Run time for alarm spectrum 5) Identified radionuclides, categories, and confidence level (if available) 6) Occupancy time 7) Monitor identification 8) Alarm condition (gamma-ray and/or neutron) 9) Background (gamma-ray and neutron) count rate and spectrum (includes real time and run time) 10) Gamma-ray count rate 11) Neutron count rate 12) Vehicle speed (if available) d) The monitor shall have the ability to store background count rate and spectra, and transfer that information at user selectable intervals to an external device, such as a computer. e) The monitor shall have the ability to store gamma-ray and neutron count rate time-history data. f) An indication shall be displayed or otherwise provided (e.g. "not identified") if a radionuclide cannot be identified when or after a measurement takes place. g) If a reliability or confidence level is associated with the identification of a radionuclide(s), the confidence level shall be provided in the data set and the manufacturer shall describe the meaning of the displayed value. h) The monitor shall have the ability to perform identification measurements with an object stationary in the detection zone. This function shall be user selectable and does not supersede the requirements stated in 6.8. The recommended measurement time shall be stated by the manufacturer and should be less than or equal to 1 min. Note: Comments are required when the requirement is not verified.

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				Test F	2esults				
				103(1					
								Yes	<u> </u>
Is the spectrum dis	play available	by manufact	urer-define	d user actio	ons?				
The monitor has the For monitors that do data as defined in i	e ability to inter o not use occu tem c)?	rnally store a upancy sens	it least 1000 ors, the mo	) complete on the one of the one one of the	occupancy c e ability to st	lata sets as defi core 3 hours of r	ned in item o neasuremen	;)? t <b>LJ</b>	L
Each occupant	cy data set	shall con	tain colle	ction an	d identifi	cation result	S	Yes	/erify Ւ
	cessed sper	trum (sne	ctra for m	ulti-detect	or system	s) obtained d	uring a sin	ale	
					or bystem	o) obtained d	occupan	sy?	
					Doc	Til Til time for alar	me and da	te?	
					Ru	n time for alar	m spectru	m?	-
	lder	ntified radio	onuclides,	categorie	es, and co	nfidence level	(if availabl	e)?	
						Occ	upancy tin	ne?	
				Alarm co	ndition (a	inionitor i amma-ray and	dentificatio	n)?	<u> </u>
Background	(gamma-ray	and neutr	ron) count	rate and	spectrum	(includes real	time and tim	run e)?	+
						Gamma-ra	y count ra	te?	
						Neutro	n count ra	te?	
					V	enicle speed			
								Vee	<u> </u>
The monitor has the	e ability to stor	e backgroun	d count rate	and spect	ra and trans	sfer that informa	tion at user	Yes	
selectable intervals	to an externa	l device, suc	ch as a com	puter?	ra, and trans			L	
1									
The monitor has ha	ive the ability t	o store gam	ma-ray and i	neutron cou	unt rate time-	history data?		Ц	
The monitor has ha	played or othe sasurement tak	o store gam rwise provic kes place?	na-ray and i led (e.g. "no	neutron cou	unt rate time-	history data? uclide cannot be	identified	L L	
The monitor has ha An indication is disp w hen or after a me If a reliability or con is provided in the da	played or othe easurement tak infidence level ata set and the	o store gamr rw ise provic kes place? is associate e manufactu	led (e.g. "nc d w ith the ic rer describe	neutron cou ot identified' dentification ed the mean	int rate time- ) if a radion of a radion ing of the di	history data? uclide cannot be uclide(s), the co splayed value?	identified nfidence lev	el L	
The monitor has ha An indication is dis w hen or after a me If a reliability or cou is provided in the di The monitor has the zone. This function recommended meas	played or othe easurement tak infidence level ata set and the e ability to perf i s user select surement time	o store gam rw ise provic xes place? is associate e manufactu orm identific able and doo is stated by	led (e.g. "no d w ith the ic rer describe ation measu es not super the manufa	neutron cou ot identification dentification ed the mean urements w rsede the m cturer and	unt rate time- ) if a radionu of a radionu ing of the di ith an object equirements should be le	history data? uclide cannot be uclide(s), the co splayed value? stationary in the stated in 6.8. Tr ss than or equal	identified nfidence lev e detection te to 1 min?		
The monitor has ha An indication is disp w hen or after a me If a reliability or con is provided in the d. The monitor has the zone. This function recommended mean	nve the ability t played or othe assurement tak infidence level ata set and the ability to perf is user select surement time	o store gam rw ise provic ces place? is associate e manufactu orm identific able and doo is stated by	na-ray and i led (e.g. "no d with the io rer describe ation measu es not super the manufa	neutron cou ot identification ed the mean urements w rsede the re cturer and	int rate time- i) if a radionu- ing of a radionu- ing of the di- ith an object equirements should be le	history data? uclide cannot be uclide(s), the co splayed value? stationary in the stated in 6.8. Tr ss than or equal	identified nfidence lev e detection te to 1 min?		
The monitor has ha An indication is dis w hen or after a me If a reliability or cou is provided in the d The monitor has the zone. This function recommended measure <b>Com</b>	Played or othe easurement taken infidence level ata set and the e ability to perf is user select surement time ments:	o store gammer rw ise provid (as place?) is associate e manufactu orm identific (able and door is stated by	na-ray and i led (e.g. "no d w ith the ic rer describe ation measu es not super the manufa	neutron cou of identification ad the mean urements w rsede the re cturer and	unt rate time- ) if a radionu- ing of a radionu- ing of the di- equirements should be le	history data? uclide cannot be uclide(s), the co splayed value? stationary in the stated in 6.8. Th ss than or equal	identified nfidence lev e detection te to 1 min?		
The monitor has ha An indication is dis w hen or after a me if a reliability or cou is provided in the d. The monitor has the zone. This function recommended mean <b>Com</b>	nents:	o store gammer rw ise provic (es place?) is associate e manufactu orm identific (able and doo is stated by	na-ray and i led (e.g. "no d w ith the ic rer describe ation measu es not super the manufa	neutron cou of identification ad the mean irements w rsede the ri- cturer and	int rate time- ) if a radiona ing of a radiona ing of the di- ith an object equirements should be le	history data? uclide cannot be uclide(s), the co splayed value? stationary in the stated in 6.8. Th ss than or equal	identified nfidence lev e detection le to 1 min?		
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The monitor has ha An indication is disj w hen or after a me If a reliability or coi is provided in the d. The monitor has the zone. This function recommended measure Com	nplayed or othe easurement tal nfidence level ata set and the e ability to perf is user select surement time ments:	o store gam rw ise provic ces place? is associate e manufactu orm identific able and doo is stated by	na-ray and i led (e.g. "no d w ith the ic rer describe ation measu es not super the manufa	neutron cou dentification ad the mean rements w rsede the ro cturer and	unt rate time- i) if a radionu- ing of a radionu- ing of the di- equirements should be le	history data? uclide cannot be uclide(s), the co splayed value? stationary in the stated in 6.8. Th ss than or equal	identified nfidence lev e detection to 1 min?		
The monitor has ha An indication is disj when or after a me If a reliability or col is provided in the d. The monitor has the zone. This function recommended mean <b>Com</b>	nents:	o store gammer rw ise provic (es place?) is associate e manufactu orm identific (able and doo is stated by	led (e.g. "no d w ith the ic rer describe ation measu es not super the manufa	neutron cou of identified' dentification ed the mean urements w rsede the rr cturer and	int rate time- ) if a radional ing of a radional ing of the di- ith an object equirements should be le	history data? uclide cannot be uclide(s), the co splayed value? stationary in the stated in 6.8. Th ss than or equal	identified nfidence lev e detection te to 1 min?	te:	



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## Section 5.4 Indication Features **Data Sheet and Report** Instrument: Model: Serial Number: **Date Performed: Test Location:** Requirement: The monitor shall provide an indication of its operational status and alarm condition, and be capable of transmitting these signals to additional remote stations. The user shall have the ability to select the visibility of the status indication. All alarm indicators shall automatically or manually reset as defined by the user. Test Protocol: Perform each action with the monitor set to automatically reset. Although there are many actions required by this test, acceptance is based on pass or failing each action. Note: Comments are required when the requirement is not verified. **Test Results** Yes No With the monitor operating normally and with all indicators functioning (remote and/or local), verify that the indicators show the monitor is operating normally. Perform a measurement and verify that this action is indicated as required. Repeat the measurement using a radiation source that will cause an alarm and verify that $\Box$ this is indicated. Verify that this alarm automatically resets after the user enterable reset time. 1 1 Remove a component such as a detector panel and verify that this failure is indicated. Reconnect the detector panel, and after the monitor returns to normal indication, remove line power and verify that this is indicated. Repeat the alarm test with the monitor set for manual reset and verify that the monitor will Ш not reset without user action. Comments: Completed by: Date: Reviewed by: Date:



Section 5.5 Occupancy and Speed Sensors for Vehicle Monitors **Data Sheet and Report** Instrument: Model: Serial Number: Date Performed: **Test Location:** Requirement: Monitors shall have the ability to support occupancy sensors and should have the ability to measure speed. If used, occupancy and speed sensors: - Shall be able to detect presence and to estimate vehicle speed to within ±30% of a known speed, indicate if a vehicle stops within the detection zone, and not count a single vehicle or object in the detection zone more than once, - Should be capable of operating on a mix of traffic (cars, vans, pickup trucks, buses, cargo trucks, trains, etc.), and - Should function under all environmental conditions stated in this standard. Rail monitors should have the ability to approximate the location of an alarm when monitoring multi-car trains. For test purposes, a system that incorporates an occupancy sensor should have the ability to perform a user selected series of consecutive occupancies automatically without the need to activate the occupancy sensor. Function variables such as occupancy time and time between occupancies shall be user-selectable. Note: Comments are required when the requirement is not verified. **Test Results** Verify Yes No The monitor has an occupancy sensor? If yes, Can it detect the presence of a vehicle? It is capable to operate in mix traffic? Can indicate if a vehicle or object stops within the detection zone? Does it count a single vehicle or object more than once? The monitor has a speed sensor?

lfyes,										
			C	an it estima	ate the vehi	cle speed?				
For rail monitor										
	car trains?									
Comments:										
Completed by:						Date:				
Reviewed by:						Date:				



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		Se	ction 5	.6 Mark	ings				
		Dat	a Shee	t and R	eport				
Instrument:	-			<b>.</b>					
Model:				Seria	I Number:				
Date Performed:				lest	Location:				
Requirement:	Internal cor technical m	ntrols shall t anuals.	be identified	through ma	rkings on ci	rcuit boards	and identifi	cation in	
	Markings s Exterior ma current requ municipal,	hall be easi rkings shall uirements, i state, federa	ly readable a l be limited t f equipped v al, and interr	and perman to the manuf with an outle national code	ently fixed u facturer's ur t plug, and s e requireme	nder norma nique serial i shall meet m ents.	l conditions number, vol ninimum ap	of use. tage and plicable	
Test Protocol:	J:       Open detector cabinets or other protected components and verify that the items as marked in the technical manual match those marked in each detection assembly and other components, such as a remote alarm panel.         CAUTION       Perform the following with line and battery power removed from the monitor.								
	Using a damp cloth, wipe at some of the markings to verify that they are permanently affixed to the component. Verify that only the minimal markings exist on the exterior of the unit.								
Note:	Comments	are require	d when the	requirement	t is not verifi	ed.			
			Test	Results					
Are internal control as identified in the	s on electri technical m	cal circuit t nanuals?	poards and/	'or individua	l componer	nts marked	Yes	No	
REMOVE THE PO the markings. Are	WER FRO	M THE MO s permaner	NITOR. Usi htly fixed?	ing a damp	cloth wipe	at some of	Ц	Ц	
Are the exterior ma	arkings limit	ed to the o	nes listed i	n the require	ement?		L		
Comments:									
Completed by:						Date:			
Reviewed by:						Date:			

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		Sectio	on 5.7 I	Power S	Supply							
		Data	a Sheet	and Re	eport							
Instrument:				0	l Musee la ave							
Model:				Seria	I Number:							
Date Performed:				lest	Location:							
Poquiromont	Line-onera	ted assemb	lies should	he designe	d to operate	from a sin		Csupply				
Requirement.	voltage of 1	100 V to 240	V and from	47 Hz to 63	Hz.	10111 a 3111	gic-pilase A	o supply				
	J. J. J. J.											
	The monito	or shall be a	ble to opera	te, including	storing me	asurement	t data for a m	ninimum of				
	3 h, if there	is a loss of	external por	wer. Compli	ance shall b	be based o	n tests perfo	rmed at the				
	reference t	emperature	of 22 °C.									
Note:	Comments	are require	d when the	requiremen	t is not verifi	ed.						
	1				-							
Temperature:		* C		Humidity:		%		Pressure:		in. Hg.		
				To at Date						_		
				Test Data								
Source Data:												
Source Data.							-			-		
	No	ominal Volta	ne	1						_		
	Gamma	Neutron	Isotopes	•							-	
	Response	Response	Identified									
1					Isoto	oe Key		Accepta	nce Range	e - Gamma		
2					Α-	<sup>137</sup> Cs						
3					В-			#DIV/0!	to	#DIV/0!	(add units)	
4					C -			-15%		+15%		
5					D -							
6								Accepta	nce Range	e - Neutron		
7		l I							-			
8								#DIV/0!	to	#DIV/0!	(add units)	
9								-15%		+15%		
10												
Mean	#DIV/0!	#DIV/0!										

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	Voltage	e + 12% of N	lominal	Voltag	e - 12% of N			
	Gamma	Neutron	Isotopes	Gamma	Neutron	Isotopes		
	Response	Response	Identified	Response	Response	Identified		
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
Mean	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!			
	Биел		211-	<b>Fre</b>		211-		
	Free	quency at 50	5 HZ	Free	Quency at 6	2 HZ		
	Gamma	Response	Isotopes	Bosponso	Posponso	Isotopes		
1	Response	Response	luentineu	Response	Response	luentineu		
2								
3								
4								
5								
6								
7								
8								
9								
10								
Mean	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!			
				Test F	Report			
		Gamma F	Response	Neutron F	Response	Isotope Ide	entification	
		Yes	No	Yes	No	Yes	No	
	- 12 %							
	+ 12 %							
	58 Hz							
	62 Hz							
Comments:								
Complete d bar						Dete		
Completed by:						Date:		
Doviourod bu						Data		
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		Secti	on 5.8	Batterv	Lifetim	e		
		Da	ta She	et and F	Report			
Instrument:								
Model:				Seria	I Number:			
Date Performed:				Test	Location:			
Requirement:	Monitors s	hall be able	e to operate	e including s	storing mea	surement data	for up to 3	8 hours if
	there is a l	oss of exte	ernal power.					
			1	1				
Note:	Comments	are require	ed when the	requiremen	t is not verifi	ed.		
110101								
						I		
							Yes	No
	id the moni	tor perform	ed within er	ocification	for the onti	a 3 h period?	1.1	11
D				Jechication		e 5 îi penou ?		
Did the monitor s	store all the	required in	formation fr	om each o	ccupancy w	ithin the 3 h?		
	_		_	_	. ,			
			Was t	he low-hatt	any indicatio	n activated?		
			1103 1					
							_	
Comments:								
<b>•</b> • • • •								
Completed by:						Date:		
<b>Baylowed</b> by						Data		
Reviewed by:						Date:		



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	Se	ection 5	.9 Prot	ection o	of Swite	hes				
Data Sheet and Report										
Instrument:										
Model:				Seria	Number:					
Date Performed:				Test	Location:					
Requirement:	Switches a	and other co	ontrols shou	uld be desig	ned to ens	ure that the	monitor is	operated		
properly while minimizing accidental switch operation.										
Note:	Comments	are require	d when the	requirement	is not verifi	ed.				
			Test	Results						
Yes										
External switches	or controls	are protecte	ed to prever	nt accidenta	l operation					
		·	· · ·							

Comments:				
Completed by:			Date:	
Reviewed by:			Date:	



# Section 5.10 Effective Range of Measurement Data Sheet and Report

Instrument:								
Model:				Seria	I Number:			
Date Performed:				Test	Location:			
Requirement:	The effection and should The manuf neutron co	ve gamma-i I be at leas acturer sha unt rate inc	t 25 keV to Il state the lication.	response ra 3 MeV. range for ga	nge shall b amma-ray c	count rate r	neasureme	acturer, nt and for
Note:	Comments	are require	d when the	requirement	is not verifi	ed.		

							Ve	rify	
							Yes	No	
Is the	Is the effective gamma-ray energy response stated by the manufacturer?								
Is the gamn	na-ray cour	nt rate mea	surement ra	ange stated	by the ma	nufacturer?			
Is the neutron count rate measurement range stated by the manufacturer?									
	E	nergy respo	onse range:						
	Gamma-ray count rate range:								
	Neu	utron count	rate range:						
Comments:									
Completed by:	Completed by: Date:								
Deviewed by	Deviewed has Defe								
Reviewed by:						Date:			



# **Section 5.11.1 Communications Protocol** and Data Format **Data Sheet and Report**

Instrument:								
Model:				Seria	I Number:	0		
Date Performed:				Test	Location:			
Requirement:	The monitor	or shall have	e the ability	to transfer	data to an	external de	vice, such a	as a
	computer.	The transfe	r shall be b	ased on a	commonly	available te	chnology su	uch as
	Ethernet, l	JSB, RS-23	32, wireless	(e.g., 802.	11), or RS-	485. Consid	deration sho	ould be
	given to da	ta security	when using	g wireless d	lata transfe	r technique	s. When us	ed,
	wireless te	chniques s	hall have th	e ability to	be encrypt	ed.		
	The transfe	er protocol a	and format	shall be full	y described	d in the tech	nnical manu	al and

shall also be freely distributable.

Data format shall be as defined in ANSI N42.42.

Note: Comments are required when the requirement is not verified.								

	Mar. 26	
	Ver	rify
	Yes	No
Does the monitor have the ability to transfer data to an external device?		
Is the transfer based on commonly available technology?		
(e.g. Ethernet, wireless, USB, RS-232)		
If the transfer is wireless, does it have the ability to encrypt the data?		
Is the transfer protocol described in the technical manual?		
Is the format described in the technical manual?		
Is it freely distributable?		
The data format complies with ANSI N42.42 requirements?		
Describe method used by monitor to transfer data:		
Comments:		
Completed by: Date:		
Reviewed by: Date:		



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# Section 5.11.2.1 Visual Indicators **Data Sheet and Report**

Instrument:										
Model:				Seria	Number:					
Date Performed:				Test	Location:					
Requirement:	The monitor should provide a color-based visual indication for the following actions:									
-										
	Alarm colo	or Type	)							
	Red	Red Neutron alarm								
	Blue SNM identification and user-selectable high-radiation alarms									
	Orange Other gamma-ray alarms (e.g., NORM)									
	Amber System error/failure									
	Green Power/system Okay									
	White Checking									
			5							
Note:	Comments	are require	d when the	requirement	is not verifi	ed.				

						Ve	rify			
						Yes	No			
				Neutron al	arm? (Red)					
SNM identification and user-selectable high-radiation alarms? (Blue										
Other gamma-ray alarms (e.g., NORM)? (Orange)										
			System	error/failur	e? (Amber)					
			Power/s	system Oka	iy? (Green)					
				Checkir	ng? (White)					
	1			1						
Describe visual indicators:										
					Deter					
					Date:					
					Date					
	NM identifi	NM identification and u Other Cribe visual indicators:	NM identification and user-select Other gamma-ra Other gamma-ra Indicators: In	NM identification and user-selectable high-ra         Other gamma-ray alarms (e         System         Power/s         ribe visual indicators:         Image: Stream of the strea	Neutron ala         Neutron ala         Other gamma-ray alarms (e.g., NORM)         System error/failur         Power/system Oka         Checkir         Ch	Neutron alarm? (Red)         Neutron alarm? (Red)         Other gamma-ray alarms (e.g., NORM)? (Orange)         System error/failure? (Amber)         Power/system Okay? (Green)         Checking? (White)         Checking? (Checking? (Checking?)         Checking? (Checking?)         Checking? (Checking?)         Checking? (Checking?)         Checking? (Checking?)         Checking? (Checking?)         Checking?         C	Ve       Yes         NM identification and user-selectable high-radiation alarms? (Red)          Other gamma-ray alarms (e.g., NORM)? (Orange)       System error/failure? (Amber)         Power/system Okay? (Green)          Checking? (White)          Image: Selectable high-radiation alarms? (Blue)          System error/failure? (Amber)          Power/system Okay? (Green)          Checking? (White)          Image: Selectable high-radiation alarms? (Blue)          Image: System error/failure? (Amber)          Power/system Okay? (Green)          Checking? (White)          Image: Selectable high-radiation alarms? (Blue)          Image: System error/failure? (Amber)          Image: Selectable high-radiation alarms? (Breen)          Image: System error/failure? (White)          Image: Selectable high-radiation alarms? (Blue)          Image: System error/failure?          Image: Selectable high-radiation alarms?          Image: Selectable high-radiation alarms?          Image: Selectable high-radiation alarms?          Image: Selectable high-radiation alarms?          Image:			



## Section 5.11.2.2 Warning indicators **Data Sheet and Report** Instrument: Serial Number: Model: Date Performed: **Test Location:** Requirement: The following indications shall be provided at the user interface as a minimum. - Background changes during non-occupancies that can affect the overall sensitivity of the monitor - Hi-Lo detector count rate conditions - Energy stabilization invalid or not acceptable - Occupancy sensor failure, if occupancy sensors are used - Changes in operational status (i.e., occupied, alarm, monitoring background, fault, blocked, etc.) - Loss of line power - Battery status Note: Comments are required when the requirement is not verified.

			Tes	<u>t Results</u>				
	Yes	No						
Background c	Ц	Ц						
				Hi-Lo detec	tor count ra	ate conditions?		
			Energy	stabilization	invalid or n	ot acceptable?		Ē
		Occup	ancy sensor	failure, if occu	pancy sens	sors are used?		
Changes in operational status (i.e., occupied, alarm, monitoring background, fault, blocked, etc.)?								L
Loss of line power?								
					E	Battery status?		
Comments:								
Completed by:						Date:		
Reviewed by:						Date:		



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# Section 5.11.2.3 Basic Indications and Functions **Data Sheet and Report**

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Instrument:											
Model:				Seria	l Number:						
Date Performed:				Test	Location:						
Requirement:	The followi	ng informati	on and cont	rol shall be	provided for	the trained	user.				
	<ul> <li>View oper</li> <li>View alarr</li> <li>Ability to re</li> </ul>	rational statu m indication eset alarms	JS								
	- View identified radionuclide(s) (user selectable through advanced or supervisory access)										
						-					
Note:	Comments	are require	d when the	requiremen	t is not verifi	ed.					
	1		1								
							Ve	rify			
							Vaa	No			
							tes	NO			
			The c	operational	status can	be viewed?	res	NO			
			The c	operational s e alarm indi	status can cation can	be viewed? be viewed?	res	NO			
		The trai	The o The ned user ha	operational s e alarm indi as the abilit	status can cation can y to reset tl	be viewed? be viewed? ne alarms?	fes				
		The trai	The c The ned user ha The identi	operational s e alarm indi as the abilit fied radionu	status can cation can y to reset tl clides can	be viewed? be viewed? ne alarms? be viewed?	fes				
ls the vie	ewing of ide	The trai	The o The ned user ha The identi onuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ole through	be viewed? be viewed? ne alarms? be viewed? advance or					
ls the vie	ewing of ide	The trai	The c The ned user ha The identi onuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ole through superviso	be viewed? be viewed? ne alarms? be viewed? advance or y access?					
ls the vie	ewing of ide	The trai	The o The ned user ha The identi onuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ble through supervisor	be viewed? be viewed? ne alarms? be viewed? advance or y access?					
Is the vie	ewing of ide	The trai	The c The ned user ha The identi onuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ole through supervisor	be viewed? be viewed? ne alarms? be viewed? advance or y access?					
Is the vie	ewing of ide	The trai	The c The ned user ha The identi nuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ole through superviso	be viewed? be viewed? ne alarms? be viewed? advance or y access?					
Is the vie	ewing of ide	The trai	The c The ned user ha The identi nuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ole through supervisor	be viewed? be viewed? ne alarms? be viewed? advance or y access?					
Is the vie	ewing of ide	The trai	The o The ned user ha The identi onuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ble through supervisor	be viewed? be viewed? ne alarms? be viewed? advance or y access?					
Is the vie	ewing of ide	The trai	The c The ned user ha The identi onuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ole through superviso	be viewed? be viewed? ne alarms? be viewed? advance or y access?					
Is the vie	ewing of ide	The trai	The c The ned user ha The identi nuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset th clides can ole through supervisor	be viewed? be viewed? be viewed? advance or y access?					
Is the vie	ewing of ide	The trai	The or The or The or The or The identication of the identication o	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ble through supervisor	be viewed? be viewed? be viewed? advance or y access?					
Is the vie	ewing of ide	The trai	The o The ned user ha The identi onuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ble through superviso	be viewed? be viewed? be viewed? advance or y access?					
Comments:	ewing of ide	The trai	The c The ned user ha The identi nuclides us	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset th clides can ole through supervison	be viewed? be viewed? be viewed? advance or y access?					
Is the vie Comments: Completed by: Reviewed by:	ewing of ide	The trai	The or The or The or The or The identition of th	operational s e alarm indi as the abilit fied radionu ser selectat	status can cation can y to reset tl clides can ble through supervisor	be viewed? be viewed? be viewed? advance or y access? Date: Date:					



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Section 5.11.2.4 Advanced Indications and Functions **Data Sheet and Report** Instrument: Model: Serial Number: Date Performed: **Test Location:** Requirement: The following information and control shall be provided for the supervisory user through the use of access controls or special commands. - Access to and control of operating parameters (radionuclide library, alarm control), - Access to and control of data logging intervals, - Access to alarm history, - Access to spectra, - Access to radionuclide identification results and control of basic indication function, - Access to occupancy data set (if occupancy sensors are used), - Access to vehicle photo (if available), - Access to radiation profiles (count rate time history data), - Access to background radiation information, - Access to alarm selection criteria including the ability to select specific radionuclides - Access to energy and/or efficiency calibration information Note: Comments are required when the requirement is not verified. **Test Results** Yes No Access to and control of operating parameters (radionuclide library, alarm control) Access to and control of data logging intervals Access to alarm history Access to radionuclide identification results and control of basic indication function Access to spectra Access to occupancy data set (if occupancy sensors are used) Access to vehicle photo (if available) Access to radiation profiles (count rate time history data) Access to radiation profiles (count rate time history data) Access to background radiation information Access to alarm selection criteria including the ability to select specific radionuclides Access to energy and/or efficiency calibration information Comments: Completed by: Date: **Reviewed by:** Date:

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		S	ectior	ה 6.2 F	alse /	Alarms				
			Data S	Sheet a	and R	leport				
						_				
Instrument:										
Model:					Seria	I Number:				
Date Performed:					Test	Location:				
De surius as sut	When too	tod in on	oroo with	a atabla b	okarow	ad (anhy nati	ural fluctuat	iona) at the lay	volo otr	tod in Tabla
Requirement:	4 the fals	e alarm	aiea willi rate shall l	he less the	ackyloui	1000 occup	ancies for s	we teme that u		
	sensors of	or one al	arm over a	2 h time n	eriod for	monitors th	at do not u	se occupancy	senso	ors In
	addition, t	the moni	tor shall n	ot identify a	radionu	clide that is	not preser	it during the te	stperi	od.
							·	U U	•	
Note:	Commen	ts are re	quired whe	en more th	an one a	alarm and/or	identificati	on other than	backgr	ound is
	observed								•	
				Test Re	sults					
Background Reading:			(add unit	s)						
Temperature:		°C	F	lumidity:		%		Pressure:	In	i. Hg.
	Numb	er of	Num	hor of	Nhue	nhor of	Num	hor of		
	Occupar	ncies or	num		noutro		identifi			
	test t	ime	yannina	aiaiiiis	neutro		Identin	cations		
		1								
Comments										
commenta.										
Completed by:							Date:			
· · ·										
Reviewed by:							Date:			

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Section 6.3 Response to Gamma-ray Radiation															
				Data	a Sl	heet an	d F	Report							
								_							
Instrument:													_		
Model:											Seria	al Nun	nber:		_
Date Performed:											Tes	t Loca	tion:		_
<b>_</b>	A												4 4	4	
Requirement:	Amonit	tor snall a	larm wn	en gamn	na-ra	y exposure i bot oposifio	ate (I	.e., overall	COUNT	rate) measi	ured as a	an obje	ect transi	ts through	gn the
	chall al	arm a mir		f 10 time	i IOI u	50 occupant		The vieual i	indica	tion shall be	er urarr u activate	ie aiai d as d	ofined in	ston 5	1121
	Shanai	ann ann			5 11 0		163.		inuica			u as u	enneum	step 5.	11.2.1.
						1		1			1				
Noto	Comme	onte aro r	oquirod	when the	roqu	uromont is r		rified							
Note.	Comme		equireu	when the	requ	inementis i		meu.							
						Tost Posu	lte								
						Test Nesu	115								
Background Reading:				(add ur	nite )										
Dackground Reading.			-	(อินัน น	113)										
Temperature		°C	_			Humidity:		%				Pros	suro.	In I	Ηα
remperature.		- U				nunnanty.		70				1103	sure.		ig.
			_												
				2011/2001		57	2			133					-
				source:	- 60			Da							
			Sourc	e Data:							_				_
					Nu	mber of	Nu	mber of	Nu	mber of	Numb	er of			
					occ	upancies	a	larms	occ	upancies	alar	ms			
				Bottom											
	Mi	d-Point I	Bottom/	Middle											
				Middle											
		Mid-Po	int Mide	dle/Top					1						
				Тор											
Comments:															
Completed by:												Date:			
Reviewed by:												Date:			
		_													



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Data Sheet and Report         Instrument:       Serial Number:         Model:       Serial Number:         Date Performed:       Test Location:         Requirement:       A monitor shall alarm when the neutron exposure rate (i.e., count rate) measured as an object transits through the detection zone at the speed stated for that specific application (see Table 2), is greater than alarm setting.         The monitor shall alarm a minimum of 49 times in 50 occupancies. The visual indication shall be activa as defined in step 5.11.2.1.         Note:       Comments are required when the requirement is not verified.	the ated
Instrument:       Model:       Serial Number:         Date Performed:       Image: Serial Number:       Image: Serial Number:         Requirement:       A monitor shall alarm when the neutron exposure rate (i.e., count rate) measured as an object transits through the detection zone at the speed stated for that specific application (see Table 2), is greater than alarm setting.         The monitor shall alarm a minimum of 49 times in 50 occupancies. The visual indication shall be activa as defined in step 5.11.2.1.         Note:       Comments are required when the requirement is not verified.	ated
Model:       Serial Number:         Date Performed:       Test Location:         Requirement:       A monitor shall alarm when the neutron exposure rate (i.e., count rate) measured as an object transits through the detection zone at the speed stated for that specific application (see Table 2), is greater than alarm setting.         The monitor shall alarm a minimum of 49 times in 50 occupancies. The visual indication shall be activa as defined in step 5.11.2.1.         Note:       Comments are required when the requirement is not verified.	the ated
Date Performed:       Test Location:         Requirement:       A monitor shall alarm when the neutron exposure rate (i.e., count rate) measured as an object transits through the detection zone at the speed stated for that specific application (see Table 2), is greater than alarm setting.         The monitor shall alarm a minimum of 49 times in 50 occupancies. The visual indication shall be activa as defined in step 5.11.2.1.         Note:       Comments are required when the requirement is not verified.	1 the
Requirement:       A monitor shall alarm when the neutron exposure rate (i.e., count rate) measured as an object transits through the detection zone at the speed stated for that specific application (see Table 2), is greater than alarm setting.         The monitor shall alarm a minimum of 49 times in 50 occupancies. The visual indication shall be activa as defined in step 5.11.2.1.         Note:       Comments are required when the requirement is not verified.	i the
Requirement:       A monitor shall alarm when the neutron exposure rate (i.e., count rate) measured as an object transits through the detection zone at the speed stated for that specific application (see Table 2), is greater than alarm setting.         The monitor shall alarm a minimum of 49 times in 50 occupancies. The visual indication shall be activa as defined in step 5.11.2.1.         Note:       Comments are required when the requirement is not verified.	ated
Note: Comments are required when the requirement is not verified.	
Test Results	
Background Reading: (add units)	
Temperature: °C Humidity: % Pressure: In. H	lg.
	-
Source: <sup>252</sup> Cf	
Source Data:	
Number of Number of alarms	
Bottom	
Mid-Point Bottom/Middle	
Middle	
Mid-Point Middle/Top	_
Comments:	
	-
Reviewed by: Date:	



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				Se	ction	6.5 (	Dvei	rload							
				Dat	a She	et ai	าd R	eport							
								•							
Instrument:															
Model:											Serial N	lumber:			
Date Performed:											Test Lo	ocation:			
Requirement:	If a monito or when pe "high coun reset/ackn defined in The time r than 1 min	r is sub erformin its," sha owledgi step 5.1 equired	jected g mea II be a ed by 1.2.1. to retu	to an ex asurement inctivated the user. urn to no	posure r ents with and sha . The visu n-alarm	ate that out an o I remain al indic conditio	is grea ccupar n activa ation fi n after	ater than th ncy sensor ated until th or the user the expos	ne mai r, an a he exp r selec ure ra	nufacturer larm indic osure rate table high te is return	-stated ma ating, for e is reduce n radiation ned to bac	aximum di example "I ed or the a a alarm sh kground s	uring an nigh bac Iarm is all be ac hall be r	occup kgrour tivatec	oancy nd" or d as eater
Note:	Comment	s are re	quired	i when th	ne require	ementi	s not ve	erified.							
								T4 P	D - 4-						
								lesti	<u>Data</u>						
Background Poading:			(add	unite)											
Background Reading.			lauu	units)											
Temperature:	•	С		Hu	midity:		%				Р	ressure:		In. Ho	1.
Tomporataio		-			linaity.		- /0					locouro.			<b>.</b>
Source Data:															
Maximum exposure	rate state	d by m	anufa	cturer:				(add uni	its)						
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										Yes	No				
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		3													
										Yes	No				
Did the monitor remai	n in alarm	until the	e expo	osure ra	te was r	educed	to the	pre-test l	level?						
Comments:															
		_													
														_	
Completed by:											Date:				
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Reviewed by:				-							Date:				



Section 6	.6 Ne	eutroi	n Ind	icat	ion	in tl nd F	he Pi Seno	resen	ce of	fPł	otor	IS	
		L			εια		(eho	1.					
Instrument:													
Model:									Seria	Nur	nber:		
Date Performed:		· · · ·							Test	Loca	ation:		
Requirement:	Gamm	a radiati	on at ex	oosure	e rates	ofup	to 10 m	R/h (at th	e face o	of the	center o	of the dete	ction
	assen	ibiy) sha	nnorung	iyei ili	eneu	uonai	ann.						
Note:	Comm	ents are	require	d whe	n the r	equire	ementis	not verifie	ed.		<u> </u>		
Background Reading:			(add	units)									
Temperature:		° C		Humi	idity:		%			Pres	sure:	In. H	g.
Ostras Data													
Source Data:			-										
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Monitors Used for Homeland

**TITLE: Spectroscopy- Based Portal** 

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			Data	a She	et ar	nd R	Repo	ort						
Instrument:														
MODEI: Data Darfarmadu					_	_		56	eria		ber:			
Date Performed:			_			_		-	est	Loca	uon:		-	
Requirement:	The more to cause and sha	nitor sh a sub II be di	nall pro stanti ifferen	ovide a w al chang t than mo	varning e in ala onitoring	indica rm pro g alarr	tion wh babilit ns.	nen a d ty. The	chan indio	ge in l cation	backg shall	round is l be visual	arge enou and audib	gh le
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Note:	Comme	nts are	e requ	ired whe	n the re	quiren	nentis	not ve	rifie	d.				
				T	est Dat	a								_
Background Reading:			(add	d units)										
										_				
Temperature:	°C			Humidi	ty:	_%				Press	sure:		In. Hg.	
Source Data:														
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												Yes	No	
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								moi	nitor	ing ala	arm?			
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TITLE: Spectroscopy- Based Portal Monitors Used for Homeland Security

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# Section 6.8.1 Radionuclide Categorization Data Sheet and Report

					_			
Instrument:								
Model:				Seria	I Number:			
Date Performed:				Test	Location:			
Requirement:	The manut	facturer shal	II state the ra	adionuclides	s that the mo	onitor can ide	entify and the	eir
	category. T	he categorie	es selected	should be b	ased on the	list shown ii	n 6.8.1. The	following
	tests shall	be performe	ed based on	the manufa	acturer-provi	ded list.		
				<i>,</i> , , , ,				
	- Special N	iuciear Mate	rials: Uraniu	im (used to	Indicate 233	5U, 235U), 23	37 NP, PU.	
	- Medical r	adionuclide	s: 18F, 67G	a, 51Cr, 75S	Se, 89Sr, 991	<i>N</i> o, 99mTc, 1	03Pd, 111I	n, lodine
	(1231, 1231	, 1311), 1330	5111, 20111, 1	JJAE.				
	- Naturally and daugh	occurring ra iters.	dioactive ma	aterials (NO	RM): 40K, 22	26Ra, 232Th	and daugh	iters, 238U
	- Industrial	radionuclid	es: 57Co, 60	Co, 133Ba	, 137Cs, 192	2lr, 204Tl, 22	6Ra, and 24	41Am.
Noto	Comments		d when the	requiremen	tis notverifi	od		
Note.	oonninena	s are require		requirement		cu.		
			Test	Results				
			Test	<u>Results</u>				
			Test	Results			Yes	No
The manufacturer s	states the r	adionuclide	<u>Test</u> s that the n	Results	identify by	category?	Yes	No
The manufacturer s	states the r entify (at a	adionuclide	Test s that the n	Results	identify by	category? onuclides	Yes	No
The manufacturer s The monitor can id listed in the require	states the r entify (at a ement?	adionuclide minimum)	<u>Test</u> s that the n the four diffe	Results nonitor can erent catego	identify by pries of radi	category? onuclides	Yes	No L
The manufacturer s The monitor can id listed in the require	states the r entify (at a ement?	adionuclide minimum)	Test s that the n the four diffe	Results nonitor can erent catego	identify by pries of radi	category? onuclides	Yes L	No L
The manufacturer s The monitor can id listed in the require	states the r entify (at a ement?	adionuclide minimum)	<u>Test</u> is that the n the four diffe	Results nonitor can erent catego	identify by pries of radi	category? onuclides	Yes L	No L
The manufacturer s The monitor can id listed in the require	states the r entify (at a ement?	adionuclide minimum)	<u>Test</u> that the n the four diffe	Results nonitor can erent catego	identify by pries of radi	category? onuclides	Yes L	No L
The manufacturer s The monitor can id listed in the require Comments:	states the r entify (at a ement?	adionuclide minimum)	Test s that the n the four diffe	Results nonitor can erent catego	identify by pries of radi	category? onuclides	Yes	No L
The manufacturer s The monitor can id listed in the require Comments:	states the r entify (at a ement?	adionuclide minimum)	Test s that the n the four diffe	Results nonitor can erent catego	identify by pries of radi	category? onuclides	Yes L	No LJ
The manufacturer s The monitor can id listed in the require Comments:	states the r entify (at a ement?	adionuclide minimum)	Test that the n the four diffe	Results	identify by pries of radi	category? onuclides	Yes L	No L
The manufacturer s The monitor can id listed in the require <b>Comments</b> :	etates the r entify (at a ement?	adionuclide minimum)	Test that the n the four diffe	Results	identify by pries of radi	category? onuclides	Yes	No L
The manufacturer s The monitor can id listed in the require <b>Comments</b> :	states the r entify (at a ement?	adionuclide minimum)	Test s that the n the four diffe	Results nonitor can erent catego	identify by pries of radi	category? onuclides	Yes	No L
The manufacturer s The monitor can id listed in the require <b>Comments</b> :	etates the r entify (at a ement?	adionuclide minimum)	Test that the n the four diffe	Results	identify by pries of radi	category? onuclides	Yes	No
The manufacturer s The monitor can id listed in the require <b>Comments</b> :	etates the r entify (at a ement?	adionuclide minimum)	Test that the n the four diffe	Results	identify by pries of radi	category? onuclides	Yes	
The manufacturer s The monitor can id listed in the require <b>Comments</b> :	states the r entify (at a ement?	adionuclide minimum) f	Test s that the n the four diffe	Results nonitor can erent catego	identify by pries of radi	category? onuclides	Yes	
The manufacturer s The monitor can id listed in the require Comments:	etates the r entify (at a ement?	adionuclide minimum)	Test that the n the four diffe	Results	identify by pries of radi	category? onuclides	Yes	
The manufacturer s The monitor can id listed in the require Comments: Completed by: Reviewed by:	etates the r entify (at a ement?	adionuclide minimum)	Test that the n the four diffe	Results	identify by pries of radi	category? onuclides	Yes	
The manufacturer s The monitor can id listed in the require <b>Comments</b> :	etates the r entify (at a ement?	adionuclide minimum)	Test that the n the four diffe	Results	identify by pries of radi	category? onuclides	Yes	No L_
The manufacturer s The monitor can id listed in the require Comments: Completed by: Reviewed by:	etates the r entify (at a ement?	adionuclide minimum) f	Test s that the n the four diffe	Results nonitor can erent catego	identify by pries of radi	category? onuclides	Yes	



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## Section 6.8.2.2 Single Radionuclide Identification - Unshielded **Data Sheet and Report**

EFF. DATE

Instrumer	nt:						
Mode	el:			Se	rial Number:		
Date Performe	d:			Те	est Location:		
							-
Requiremen	nt: The monitor s manufacturer stated by the	shall identify t at the referent manufacturent 60Co_67Ga	he following rad nce speed for the r: 99mTc 131L 13	onuclides, or at specific ap 3Ba_137Cs	r at least those plication, or me	stated by the easurement of 26Ra 232Th	ycle time as
					13211, 20111, 2	2010, 202 11	
Not	t <mark>e:</mark> Comments a	re required w	hen the requirer	nent is not ve	rified.		
ansitory measu	rements Si	ngle Radio	nuclide Identif	ication Uns	hielded Sour	rces Test Da	ita
Data Barfarma	A.			40			7
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		Source Inf	ormation			
	Date	Radionuclide	Activity	Exposure rate	(add units)	
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		<sup>57</sup> Co				
		<sup>60</sup> Co				
		<sup>67</sup> Ga				
		<sup>99m</sup> Tc				
		<sup>131</sup>				
		<sup>133</sup> Ba				
		<sup>137</sup> Cs				
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## Stationary measurements

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			<sup>133</sup> Ba				
			<sup>137</sup> Cs				
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		Data	Sheet and	l Report			
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Model:				Se	rial Number:		
Date Performed:				Te	est Location:		
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Requirement:	manufacturer stated by the – HEU, RGPu	and Identity to a the reference of the manufacturer nanufacturer na	nce speed for the	at specific ap	plication, or me	easurement c	ycle time as
Note:	Comments a	re required w	hen the requirer	nent is not ve	erified.		
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Prepared by:					Date:	



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## Section 6.8.3 Identification of Shielded Radionuclides **Data Sheet and Report**

				•			
Instrument:							
Model:				S	erial Number:		
Date Performed:					Test Location:		
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Transitory measure	ments						
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			Source Ir	nformation		
		Date	Radionuclide	Activity	Exposure rate	(add units)
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			<sup>99m</sup> Tc			
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Nevieweu by.					Date.		



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**TITLE: Spectroscopy- Based Portal** 

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## Section 6.8.4 Simultaneous Radionuclide Identification **Data Sheet and Report** Instrument: Model: Serial Number: Date Performed: Test Location: Requirement: a. The monitor shall have the ability to identify more than one radionuclide simultaneously. Simultaneous identification ability shall consist of radionuclides from separate categories (e.g., 99mTc + 137Cs, 131 + RGPu). b. The monitor shall have the ability to identify a radionuclide of interest when combined with other radionuclides. Note: Comments are required when the requirement is not verified. Transitory measurements Simultaneous Radionuclide Identification Test Data <sup>40</sup>K + <sup>226</sup>Ra + <sup>232</sup>Th + RGPu **Date Performed:** Mid-point Bottom Mid-point Top/Middle Тор Bottom and Middle Middle 2 3 4 5 6 7 8 9

NIST	TEST AND EVALUATION PROTOCOL	<b>TEP NO.</b> N42.38	<b>PREPARED BY:</b> DIV682		
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Date Performed:		<sup>40</sup> K + <sup>226</sup> Ra + <sup>232</sup> Th + DU				
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Date	Mix	Radionuclide	Activity	Exposure rate	(add units
		<sup>40</sup> K			
	<sup>40</sup> K + <sup>226</sup> Ra +	<sup>226</sup> Ra			
	<sup>232</sup> Th + RGPu	<sup>232</sup> Th			
		RGPu			
		<sup>40</sup> K			1
	<sup>40</sup> K + <sup>226</sup> Ra +	<sup>226</sup> Ra			
	<sup>232</sup> Th + DU	<sup>232</sup> Th			
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	99m	<sup>99m</sup> Tc			
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	99mma , DODU	<sup>99m</sup> Tc			1
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	5	Simultaneous Radio	nuclide Iden	tification Test Da	ta	
Measurement time:		min				
Date Performed:		<sup>40</sup> K + <sup>22</sup>	<sup>6</sup> Ra + <sup>232</sup> Th + R	CGPu		]
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Date Performed:		<sup>40</sup> K + <sup>226</sup> Ra + <sup>232</sup> Th + DU					
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	Source Information						
	Date	Mix	Radionuclide	Activity	Exposure rate	(add units)	
			<sup>40</sup> K				
		<sup>40</sup> K + <sup>226</sup> Ra +	<sup>226</sup> Ra				
		<sup>232</sup> Th + RGPu	<sup>232</sup> Th				
			RGPu				
			<sup>40</sup> K				
		<sup>40</sup> K + <sup>226</sup> Ra +	<sup>226</sup> Ra				
		<sup>232</sup> Th + DU	<sup>232</sup> Th				
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		99mTc + DU	<sup>99m</sup> Tc				
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			<sup>99m</sup> Tc				
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Section 6	6.8.5 Ov	erload (	Charact	eristics	for Ide	ntificatio	n	
		Test D	ata and	Report				
Instrument:				Soria	. Numbori			_
Nodel.				Jena	t Location:			-
bate i enormed.				163				-
Requirement:	The manufa	cturer shall s	state the max	kimum gamn	na-ray expos	ure rate (μR/I	nr) relative	
	to <sup>13</sup> 'Cs for i	dentification.				1		
Note:	Comments	are required	when the re	quirement is	not verified.			
Maxin	num expos	ure rate sta	ited by ma	nufacturer:		(add units)		
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tionary	measurem	ents							
	Measurer	nent time:		min					
	Tost	Data	1			Test Report	•		
	Radion	uclides				rest Report			
	Ident	ified							
	1			The me		lu identified	Yes	No	
	2			6 me	<sup>60</sup> Co in 8 out of 10 trials				
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								
	Correct	0%	(Enter Yes/	/No)					
C	Comments:								
•						D. (			
Com	ipleted by:					Date:			
<b>D</b>	dawa di kuri					Deter			
K6/	viewea by:					Date:			



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	Se	ction 6.8	8.6 Pile-	Up Effe	cts			
		Test Da	ata and	Report				
Instrument:				Soria	al Numbor:			
Date Performed:				Jena	t I ocation:			
Date i offernieu.				100	Loouton			
Requirement:	The monitor have recent	shall correc y received ra	tly identify rad diation thera	dionuclides f py treatment	hat are asso s (131I).	ciated with p	eople who	
Note:	Comments	are required	when the rea	quirement is	not verified.			
Background	d Reading:				(add units)			
Temperature:		°C	Humidity:		%	Pressure:		In. Hg.
Source Data:								
Transitory measurem	ents							
Test	Data				Test Repor			Ì
Iden	tified							
1			The monito	r correctly id	dentified <sup>131</sup> I	Yes	No	
2			in 8 out of 1	0 trials		$\square$	L	
3								<u> </u>
5								
6								
7								
8								
9								
10								
Correct	0%	(Enter Yes/	No)					

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ationary	measurem	nents							
	Measure	ment time:		min					
			Ĭ	ir					
	Test	Data							
	Iden	lified					Voo	No	
	1			The monito	r correctly id	dentified 131	res	INO	
	2				in 8 out of 10 trials				
	3								
	5								
	5								
	7								
	8								
	9								
	10								
	Correct	0%	(Enter Yes	/No)					
C	Comments:								
Com	pleted by:					Date:			
Rev	viewed by:		1			Date:			



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		Sectio	n 6.9 Det	ermination	n of Efficien	су				
			D	ata Sheet						
	Instrument:									
	Model:				s	erial Number:				
Date	Performed:					Test Location:				
Requirement:	Requirement: The manufacturer shall state the full-energy-peak efficiency for 57Co (122 keV at 85.51%, T1/2 = 272 d), 133Ba (356 keV at 62.05%, T1/2 = 10.5 y), 137Cs (662 keV at 85.1%, T1/2 = 30 y), and 60Co (1173 and 1332 keV at 99.857% and 99.983%, respectively, T1/2 = 5.27 y).   NOTE—Data from Evaluated Nuclear Structure Data File (ENSDF) and Bureau National de Métrologie-Laboratoire National Henri Becquerel/Commissariat á l'énergie atomique (BNM-LNHB/CEA)   Notes: Comments are required when the requirement is not verified.									
			Test Result	s (Peak Efficie	ncv)					
			<u>10301103011</u>							
	Ambien	t Conditions:		°C		%RH		in HG		
	Test Equi	pmentUsed:								
Note: if	the monitor	uses multiple	detectors the	e information b	elow needs to be	e recorded for e	each detector			

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Detector 1								
		1	Efficien	cy Results				
			Source	Measured Efficiency	Manufacturer Stated Efficiency			
			Co-57	#VALUE!				
			<sup>60</sup> Co, Pk1	#VALUE!				
			<sup>60</sup> Co, Pk2	#VALUE!				
			Ba-133	#VALUE!				
			Cs-137	#VALUE!				
			Test Measure	ements (Peak	Efficiency)			
			Table 1. Pea	ak dps comput	ations			
	Source	ID	Decayed activity to date (uCi)	Decayed Activity (Bq)	Abundance (Abd)	Peak (gammas/s)		
	<sup>57</sup> Co			#VALUE!	0.8551	#VALUE!		
	<sup>60</sup> Co, Pk1			#VALUE!	0.99857	#VALUE!		
	<sup>60</sup> Co, Pk2			#VALUE!	0.99983	#VALUE!		
	<sup>133</sup> Ba			#VALUE!	0.6205	#VALUE!		
	<sup>137</sup> Cs			#VALUE!	0.851	#VALUE!		
		TT	Table 2. Net P	eak cps comp	utations			
	Source	Gross Peak Area	Peak Bkg	Net Peak Area	Acquisition time seconds	Net Peak Count Rate	Measured efficiency	
	<sup>57</sup> Co			#VALUE!		#VALUE!	#VALUE!	
	<sup>60</sup> Co, Pk1			#VALUE!		#VALUE!	#VALUE!	
	<sup>60</sup> Co, Pk2			#VALUE!		#VALUE!	#VALUE!	
	<sup>133</sup> Ba			#VALUE!		#VALUE!	#VALUE!	
	<sup>137</sup> Cs			#VALUE!		#VALUE!	#VALUE!	

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Detector 2								
			Efficien	cy Results				
			Source	Measured Efficiency	Manufacturer Stated Efficiency			
			Co-57	#VALUE!				
			<sup>60</sup> Co, Pk1	#VALUE!				
			<sup>60</sup> Co, Pk2	#VALUE!				
			Ba-133	#VALUE!				
			Cs-137	#VALUE!				
			Test Measure	ements (Peak	Efficiency)			
			Table 1 Des	k dos comput	ations			
				ik ups compu	auons			
	Source	ID	activity to date (uCi)	Decayed Activity (Bq)	Abundance (Abd)	Peak (gammas/s)		
	<sup>57</sup> Co			#VALUE!	0.8551	#VALUE!		
	<sup>60</sup> Co, Pk1			#VALUE!	0.99857	#VALUE!		
	<sup>60</sup> Co, Pk2			#VALUE!	0.99983	#VALUE!		
	<sup>133</sup> Ba			#VALUE!	0.6205	#VALUE!		
	<sup>137</sup> Cs			#VALUE!	0.851	#VALUE!		
				•				
		1	able 2. Net P	еак срѕ сотр	utations			
	Source	Gross Peak Area	Peak Bkg	Net Peak Area	Acquisition time seconds	Net Peak Count Rate	Measured efficiency	
	<sup>57</sup> Co			#VALUE!		#VALUE!	#VALUE!	
	<sup>60</sup> Co, Pk1			#VALUE!		#VALUE!	#VALUE!	
	<sup>60</sup> Co, Pk2			#VALUE!		#VALUE!	#VALUE!	
	<sup>133</sup> Ba			#VALUE!		#VALUE!	#VALUE!	
	<sup>137</sup> Cs			#VALUE!		#VALUE!	#VALUE!	
Comments:								
Completed by:						Date:		
Reviewed by:						Date:		



## Section 6.10 Determination of Full Width Half Maximum (FWHM) **Data Sheet and Report** Instrument: Serial Number: Model: Test Location: **Date Performed:** Requirement: The manufacturer shall state the FWHM as defined in the IEEE standard appropriate to the detector used for 137Cs (662 keV at 85.1%). Notes: Comments are required when the requirement is not verified. **Ambient Conditions:** °C %RH in HG Test Equipment Used: Source Data: Note: if the monitor uses multiple detectors the information below needs to be recorded for each detector **Detector 1** Full Width Half Maximum Measurements Manufacturer's Stated Measured value FWHM Cs-137 (keV) FWHM Cs-137 (keV) Acceptance Range (Based on Manufacturer's 0.00 0.00 - 20 % + 20 %

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Detector 2					
	Full Width H	alf Maximum Me	easurements		
	Manufactur	er's Stated	Measur	ed value	
	FWHM Cs	-137 (keV)	FWHM C	s-137 (keV)	
	Acceptan	ce Range			
	(Based on Ma	nufacturer's			
	0.00	0.00			
	- 20 %	+ 20 %			
Comments:					
Completed by:				Date:	
Reviewed by:				Date:	



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		Sec	tion 7 1	<b>A</b> mhio	nt Tor	nneratur	٩			
		060	Toet	Data an	d Poi	nperature	•			
			1621	Dala all	u Rej	5011				
	Instrument:									
	Model:				S	erial Number	:			-
Date	e Performed:					Test Location	:			-
F	Requirement:	The monitor s	hall be able	to operate over	er an aml	pient temperatu	re range fron	n −30°C to	+55°C.	
		14 in			4- 4 4 44					
		It is permissing	d any comp	ecommended	, to test tr	e in an uncontr	sting compor	ment If cor	Such as	
		heating system	ms are part of	of the detectio	n svstem	it is not possib	le to test con	nonents o	nlv.	
		This test shou	Id be carried	d out in an env	vironmen	tal chamber. Hi	umidity levels	should be	low enough	
		to prevent con	densation (<	<65% RH) and	d the rate	of change of te	mperature sh	nall not exce	ed 10°C	
		per hour.								
			M 1161 41 -	- <b>-</b>			40004-	4000		
		NOTE: Level 1	Modificatio	n - Temperat	ure range	e needs to be fi		40'0		
	Note:	Comments a	re required v	when the requ	uirement	is not verified.				
				<u>Test Da</u>	ta_					
Gam	ma Backgrou	nd Reading:				(add units)				
Neuti	on Backgrou	na Reading:								
				Humidity		0/_	Drossuro		In Ha	
				Humany.		/0	Flessule.			
	Gamma	Source Data:								
										-
	Neutron	Source Data:								
		Pre-test 22°C	la stance				-			
	Gamma	Response	Identified		lsr	otope Key		Accent	ance Range	- Gamr
	(add units)	(add units)			^	5700		7.000 pt.	lieorango	
4	()	(,			R-	<sup>60</sup> Co		#DIV//01	to.	#חו
2					D -	00		#DIV/0:		#01
2								-13 /6		+1,
4				_				Accept	ance Range	- Neutr
5							_	7.000 ptd		
6								#DIV/0!	to	#DI
7								-15%		+1
8										
9								Identification	tion Accepta	ince Ra
10									of	
Mean	#DIV/0!	#DIV/0!								
STD	#DIV/0!	#DIV/0!								
CV	#DIV/0!	#DIV/0!								1

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					20%0				
		Boginning			- 30°C			16 hro	
	Commo	Deginning	lastonas	Commo	onrs	lastanas	Commo	Neutron	lastanas
	Response	Response	Identified	Response	Response	Identified	Response	Response	Identified
1	Response	Response	lacitinea	response	Response	laentinea	пезропзе	Response	lucilitieu
2									
3									
4									
5									
6									
7									
8									
9									
Moon		#DIV//01		#DIV//01	#DIV//01		#DIV//01	#DIV//01	
STD	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	
CV	#DIV/01	#DIV/0!		#DIV/01	#DIV/01		#DIV/0!	#DIV/01	
	#010/0	#010/0		#010/0:	#010/0:		#010/0:	#010/0:	
		-20°C			0°C			40°C	
	Gamma	Neutron	Isotopes	Gamma	Neutron	Isotopes	Gamma	Neutron	Isotopes
	Response	Response	Identified	Response	Response	Identified	Response	Response	Identified
1									
2									
3									
4									
5									
7									
8									
9									
10									
Mean	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	
STD	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	
CV	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	
		l							
		De elle :: l'e ::			55°C			40 1	
	<b>C</b>	Beginning	la stance	Commo	8nrs Neutren	lastanaa	Commence	16 nrs	la stance
	Bosponso	Bospopso	Isotopes	Bosponso	Posponso	Isotopes	Bosponso	Response	Isotopes
1	Response	Response	luentineu	Response	Response	luentineu	Response	Response	luentineu
2									
- 3									
4									
5									
6									
7									
8									
9									
10									
Mean	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	
STD	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	
CV	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	

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	Р	ost-test 22°C								
	Gamma	Neutron	Isotopes							
	Response	Response	Identified							
	(add units)	(add units)								
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Mean	#DIV/0!	#DIV/0!								
STD	#DIV/0!	#DIV/0!								
cv	#DIV/0!	#DIV/0!								
				<u>Test</u> R	leport					
		V	erify if mor	nitor respo	nses are v	vithin the ac	ceptance r	anges		
			Gamma R	amma Response		n Response	-	ldentif	ication	
			Yes	No	Yes	No		Yes	No	
		55°C					_			
		40°C					_	┝╴┝┥		
		0°C					-	┝┝┥		
		-20°C				╽──┝┥──	-			
		-30°C								
	<u> </u>									
	Comments:									



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		Se	ection 7	.2 Relat	ive Hur	nidity				
			Test D	Data and	d Repo	rt				
	Instrument:									
	Model:				Seria	l Number:				
Date	Performed:				Test	Location:				
Re	quirement:	The monitor s	hall be able	to operate d	uring and a	fterexposure	e to relative	humidity (R	H) levels of	
		up to 93% RH	l at an ambie	ent temperat	ure of +40°C	С.				
		There shall n	ot be any obs	servable effe	cts from the	exposure.				
		It is permissi	ole, but not re	ecommende	d, to test to	test the syst	em bytesti	ng compone	nts only,	
		such as detec	ctor(s) and a	ny compone	nts designe	a for use in	an uncontr	olled environ	ment. If	
		cooling or nea	ating system	s are part of	the detectio	n system, it	is not poss	sible to test		
		components	oniy.							
										-
	Note:	Comments a	re required	when the re	auirement i	s not verifie	d.			-
			io ioquilou		44.101.101.101					-
				Tect De						-
				Test Da	.d					
-						(				
Gamma	Backgrour	nd Reading:				(add units)				
						// .				
Neutror	Backgrour	nd Reading:				(add units)				
	Gamma	Source Data:								_
	Neutron	Source Data:								
	65% Rela	tive Humidity	y at 22°C							
	Gamma	Neutron	Isotopes	1						
	Response	Response	Identified							
1					Isotop	be Key		Accepta	nce Range	- Gamı
2				1	Α-	<sup>57</sup> Co				
3					В-	<sup>60</sup> Co		#DIV/0!	to	#DI
4					_			-15%		+1
								-13/0		+13
5								Accorto	noo Panaa	Noute
0								Accepta	nce kange	- neutr
								#DIV/01	4.0	#D"
8								#DIV/U!	ťŌ	#UI
9								-15%		+1;
10	#DIV #01	#DI\ #01		J				late of the second		
Mean	#DIV/0!	#DIV/0!						Identificati	on Accepta	ance Ra
<u> </u>	#1)1\//01	#DIV/0!		1				1	ot	1
STD										



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	93% Relative Humidity at 40°C									
		Hour 1		Hour 2			Hour 3			
	Gamma	Neutron	Isotope ID	Gamma	Neutron	Isotope ID	Gamma	Neutron	Isotope ID	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Mean	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		
			020/ Da	lativa Iliva		N°O				
		llaun 4	93% Re	lative Hun	licity at 40			Llaur C		
	0	Hour 4		0	Hour 5	In stand ID	0	Hour 6	la stana ID	
	Gamma	Neutron	Isotope ID	Gamma	Neutron	Isotope ID	Gamma	Neutron	Isotope ID	
2										
3										
5										
6										
7										
8										
9										
10										
Mean	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		
			93% Re	lative Hun	nidity at 40	)°C				
		Hour 7			Hour 8					
	Gamma	Neutron	Isotope ID	Gamma	Neutron	Isotope ID	Gamma	Neutron	Isotope ID	
1										
2										
3										
4										
5										
6										
7										
8										
9										
Moan	#DIV/0	#DIV/0		#DIV/0	#DIV/0		#DIV/0	#DIV/0		
IVIEdI		#010/0:		#010/0!	#DIV/0!			#010/0!		
		1	1							



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	93% Relative Humidity at 40°C									
		Hour 10		Hour 11			Hour 12			
	Gamma	Neutron	Isotope ID	Gamma	Neutron	Isotope ID	Gamma	Neutron	Isotope ID	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Mean	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		
			93% Re	lative Hun	nidity at 40	)°C				
		Hour 13			Hour 14			Hour 15		
	Gamma	Neutron	Isotope ID	Gamma	Neutron	Isotope ID	Gamma	Neutron	Isotope ID	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Mean	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		
	93% Rela	tive Humidi	ty at 40°C			65% Relat	ive Humid			
		Hour 16								
	Gamma	Neutron	Isotope ID			Gamma	Neutron	Isotope ID		
1					1					
2					2					
3					3					
4					4					
5				-	5					
6				-	6					
7					7					
8					8					
9					9					
10					10					
Mean	#DIV/0!	#DIV/0!			Mean	#DIV/0!	#DIV/0!			
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	65% Relat	ive Humidi	ty at 22°C							
	Gamma	Neutron	Isotope ID							
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
iean	#DIV/0!	#DIV/0!								
										-
					Test R	enort				
					<u>Test R</u>	eport				
		V	erifv if moni	tor respo	<u>Test R</u> nses are wi	eport thin the a	cceptance	ranges		
		V	erify if moni	tor respo	<u>Test R</u> nses are wi	<u>eport</u> ithin the a	cceptance	ranges		
		V	erify if moni	tor respoi Gamma	Test R nses are wi Response	thin the a	cceptance Response	ranges	Identif	ication
		V	erify if moni	tor respor Gamma Yes	Test R	eport thin the a Neutron Yes	cceptance Response No	ranges	ldentif Yes	ication No
	93% Re	V lative Humi	erify if monit	tor respon Gamma Yes	Test R nses are wi Response No	thin the a Neutron I Yes	cceptance Response No	ranges	Identif Yes	ication
	93% Re 65% Re	V lative Humi lative Humi	erify if monit dity at 40°C dity at 40°C	tor respon Gamma Yes	Test Response	thin the and Neutron I	cceptance Response No	ranges	Identif Yes	ication No
	93% Re 65% Re	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon Gamma Yes	Test R nses are wi Response No	thin the a Neutron	cceptance Response No	ranges	Identif Yes	ication No
	93% Re 65% Re	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon Gamma Yes	Test R nses are wi Response No	thin the a Neutron I Yes	cceptance Response No	ranges	Identif Yes	ication No
	93% Re 65% Re Comments:	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon Gamma Yes	Test R nses are wi Response No	thin the a Neutron I Yes	cceptance Response No	ranges	Identif Yes	ication No
	93% Re 65% Re Comments:	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon Gamma Yes	Test R nses are wi	thin the a Neutron I Yes	cceptance Response No	ranges	Identif Yes	ication No
	93% Re 65% Re Comments:	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon Gamma Yes	Test R nses are wi Response No	thin the a Neutron I Yes	cceptance Response No	ranges	Identif Yes	ication No
	93% Re 65% Re Comments:	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon Gamma Yes	Test R	thin the a	cceptance Response No	ranges	Identif Yes	ication No
	93% Re 65% Re Comments:	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon Gamma Yes	Test R	thin the a	cceptance Response No	ranges	Identif Yes	ication No
	93% Re 65% Re Comments:	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon Gamma Yes	Test R	thin the a	cceptance Response No	ranges	Identif Yes	ication No
	93% Re 65% Re Comments:	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon Gamma Yes	Test R	thin the a	cceptance Response No	ranges	Identif Yes	ication No
Com	93% Re 65% Re Comments:	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon	Test R	thin the a	Cceptance Response No	ranges	Identif Yes	ication No
Com	93% Re 65% Re Comments:	V lative Humi lative Humi	erify if moni dity at 40°C dity at 40°C	tor respon Gamma Yes	Test R	thin the a	Cceptance Response No L	ranges	Identif Yes	fication No



	S	ection	7.3 Dus	st and M	<i>l</i> loistur	е		
		Tes	t Data a	and Re	port			
Instrument: Model:				Soria	l Numbor			
Date Performed:				Test	Location:			
Requirement:	The monito meet the re dust and sp not penetra safety, and effects.	r, including quirements blashing wa te in a quan water splas	component stated for IF ter. For IP54 tity to interfe hed agains	s designed f code 54 (s t, the ingress ere with satis t the enclose	for use in ar ee IEC 605 s of dust is i factory oper ure from any	i unprotecte 29), protecte not totally pri- ration of the direction sl	d environme ed from the i evented, but instrument hall have no	ent, shall ngress of t dust shall or to impair harmful
Note:	Comments	are require	ed when the	e requireme	nt is not ve	rified.		

				Test Dat	ta - Dust			
Ten	perature:		°C	Humidity:		%	Pressure:	in Hg.
S	ource Data:							
	Pre-Test	Post-Test		Accepta	nce Range	- Gamma		
	<sup>137</sup> Cs	<sup>137</sup> Cs						
1				#DIV/0!	to	#DIV/0!		
2				-15%		+15%		
3								
4								
5				Inspectio	on Results			
6								
7								
8								
9								
10								
Mean	#DIV/0!	#DIV/0!						
STD	#DIV/0!	#DIV/0!						
CV	#DIV/0!	#DIV/0!						

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				lest Data	- woisture	<u>e</u>					
	Pre-Test	Post-Test		Accepta	ance Range	e - Gamma					
	<sup>137</sup> Cs	<sup>137</sup> Cs									
1		i		#DIV/0!	to	#DIV/0!					
2				-15%		+15%					
3											
4											
5				Inspect	ion Result	S					
6											
7											
8											
9											
10											
Mean	#DIV/0!	#DIV/0!									
STD	#DIV/0!	#DIV/0!									
CV	#DIV/0!	#DIV/0!									
										_	
										-	
					Test	Report					
					Test	Report					
			/erify if n	nonitor res	<u>Test</u> sponses ar	<u>Report</u> re within the	e acceptan	ce ranges	5		
			/erify if n	nonitor res	<u>Test</u> sponses ar	<u>Report</u> re within the	e acceptan	ce ranges	5 		
			/erify if n	nonitor res	<u>Test</u> sponses ar	Report re within the	e acceptan Yes	ce ranges No	5		
			/erify if n	nonitor res	<u>Test</u> sponses ar Dus	Report e within the st Exposure	e acceptan Yes L⊒	ce ranges No	5		
			/erify if n	nonitor res	<u>Test</u> sponses ar Dus	Report e within the st Exposure	e acceptan Yes	ce ranges No	5		
			/erify if n	nonitor res	<u>Test</u> sponses ar Dus Moisture	Report e within the st Exposure e Exposure	e acceptan Yes	ce ranges No	5		
			/erify if n	nonitor res	<u>Test</u> sponses ar Dus Moisture	Report e within the st Exposure e Exposure	e acceptan Yes	ce ranges No	S		
			/erify if n	nonitor res	<u>Test</u> sponses ar Dus Moisture	Report re within the st Exposure e Exposure	e acceptan Yes	ce ranges No	S		
			/erify if n	nonitor res	<u>Test</u> sponses ar Dus Moisture	Report re within the st Exposure e Exposure	e acceptan Yes	ce ranges No	S		
	omments:		/erify if n	nonitor res	<u>Test</u> sponses ar Dus Moisture	Report re within the st Exposure e Exposure	e acceptan Yes	ce ranges No	S		
	omments:		/erify if n	nonitor res	<u>Test</u> sponses ar Dus Moisture	Report re within the st Exposure e Exposure	e acceptan Yes	ce ranges No	5 		
c	omments:		/erify if n	nonitor res	<u>Test</u> sponses ar Dus Moisture	Report re within the st Exposure e Exposure	e acceptan Yes	ce ranges	5 		
C	omments:		/erify if n	nonitor res	<u>Test</u> sponses ar Dus Moisture	Report re within the st Exposure e Exposure	e acceptan Yes	ce ranges	5 		
C	omments:		/erify if n	nonitor res	<u>Test</u> sponses ar Dus Moisture	Report re within the st Exposure e Exposure	e acceptan Yes	ce ranges	5 		
C	omments:		/erify if n	nonitor res	<u>Test</u> sponses ar Dus Moisture	Report re within the st Exposure e Exposure	e acceptan Yes	ce ranges	S		
Com	omments:		/erify if n	nonitor res	Test sponses ar Dus Moisture	Report re within the st Exposure e Exposure	e acceptan Yes	ce ranges	S		
Com	omments:		/erify if n	nonitor res	Test sponses ar Dus Moisture	Report re within the st Exposure e Exposure	e acceptan Yes	ce ranges	S		

|--|

**TITLE: Spectroscopy- Based Portal** 

Security

Monitors Used for Homeland

2010-11-09

		Sectio	n 8.1 Eleo	ctrostatic	Dischar	rge (ES	D)			
			Testl	Data and	Report					
	nstrument:									_
	Model:				Seria	I Number:				
Date H	Performed:				lest	Location:				_
Po	nuiromont:	The monitor	shall function	a properly after	exposure to	electrostat	ic discharge	e at inton	sities of up	-
Rei	quirement.	to 6 kV		i piopeny allei	exposure to	electiostat	ic discriarye		silles of up	
		10 0 11 1								-
	Note:	Comments	are required v	when the require	ement is not	verified.				-
			•	· ·		4				
Tei	nperature:		°C	Humidity:		%	Pressure:		in Hg.	
lestE	quipment:									
Gamma S	ource Data:									
Neutron S	ource Data:									
									P	
								Acc	eptance Ra	inge
	Des	Ta 44	1	Dere	T				ппа васкуг	
	Pre-	Test		Pre-	lest			#DIV/0!	το	#D
	Ambient	Gamma		Ambient	Neutron			4 5 9/		
	Background			Background	Response			-15%		Ŧ
	Jackyrounu		(add unita)	Dackground		(add unita)		Accorto	nee Denre	Com
1			(add units)			(add units)		Ассеріа	ince kange	- Gam
2								#DIV/01	to	#D
3								#DIV/0:	10	#0
								-10/0		
6										
7								Acc	eptance Ra	inge
8								Neu	tron Backor	ound
9								#DIV/0!	to	#D
10								-15%		+1
Mean	#DIV/0!	#DIV/0!	1	#DIV/0!	#DIV/0!					<u> </u>
STD	#DIV/0!	#DIV/01		#DIV/0!	#DIV/01			Accenta	nce Range	- Neut
cov	#DIV/01	#DIV/01		#DIV/0!	#DIV/01			Accopia		
			4	#510/0:	#010/0:			#DI\//01		#D
								$\pi_1 \dots \dots$	τn	<b>H H H H</b>
								#DIV/0!	το	#D

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			-			(0) 1.10				
			Occupan	cy Mode with	nout Source	s (Check if	alarms) - 1	2kV		
	Poi	nt 1	Po	int 2	Poir	nt 3	Poi	nt 4	Poi	nt 5
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Alarms										
			Occupancy	Mode with S	ources (Che	ck if out of	tolerance	) - 2kV		<u>.</u>
	Poi	nt 1	Po	int 2	Poi	nt 3	Poi	nt 4	Poi	int 5
	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron
1										
2										
- 3										
4										
5										
6										
7										
8										
9										
10										
Moan				#DIV/01	#DIV//01					
Mean	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
			New Orean	Mada				01-1/		
			Non-Occupa	ancy wode w	Innout Sour	ces (Check	ir alarms	- 2KV		
	Poi		Po		Poir	nt 3	Poi	nt 4	Poi	nt 5
	Yes	NO	Yes	NO	Yes	NO	Yes	NO	res	NO
1				l	ļ					<b> </b>
2				l	ļ	l				<b> </b>
3						L				<b> </b>
4					ļ	l			<b> </b>	<b> </b>
5										L
6										
7										L
8										L
9									L	
10					<u> </u>					
Alarms										

TEST AND EVALUATION PROTOCOL	<b>TEP NO.</b> N42.38	PREPARED BY: DIV682	
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		No	n-Occupanc	y Mode with	Sources (C	heck if out	of toleran	ce) - 2kV		
	Poi	nt 1	Poi	int 2	Poi	nt 3	Poi	nt 4	Poi	nt 5
	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Mean	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
			2kV - Tes	t Report						
					Yes	No				
		In occupa	ncy mode, s	ystem alarm						
	In occu	upancy mode	e, readings v	within range						
	In	non-occupa	ncy mode, s	ystem alarm						
	In non-occu	upancy mode	e, readings v	within range						
			Occupan	cy Mode with	nout Source	s (Check if	alarms) -	4kV		
	Poi	nt 1	Poi	int 2	Poir	nt 3	Poi	nt 4	Poi	nt 5
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Alarms										

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			Occupancy I	Mode with S	ources (Che	ck if out of	ftolerance	) - 4kV					
	Poi	nt 1	Poi	nt 2	Poir	nt 3	Poi	nt 4	Poi	nt 5			
	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron			
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
Mean	#DIV/01	#DIV/01	#DIV/01	#DIV/01	#DIV/01	#DIV/0I	#DIV/01	#DIV/01	#DIV/01	#DIV/01			
Wican	#DIVIO:	#BIV/0:	#BIVIO:	WDIVIO:	#BIVIO.	THE NUT	THE NUT	HEIVIO.	#DIVIO:	#DIVIO.			
			New Occurry				. : <b>f</b>	4137					
	Dei	Non-Occupancy Mode Without Sources (Check if alarms) - 4kV Point 1 Point 2 Point 2 Point 4 Point 5											
	Pol	nt 1	Pol		Point 3		POI	nt 4	POI	nt 5			
	Yes	NO	Yes	NO	Yes	NO	Yes	NO	Yes	NO			
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
Alarms													
		No	on-Occupanc	y Mode with	Sources (C	heck if out	of toleran	ce) - 4kV					
	Poi	int 1	Poi	nt 2	Poir	nt 3	Poi	nt 4	Poi	nt 5			
	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron			
1													
2													
3													
4													
5		1											
6		1											
7													
8													
9													
10		1											
Moon													
iviedn	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#017/01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			

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			4kV - Test	t Report						
					Yes	No				
		In occupa	ncy mode, s	ystem alarm						
	In occ	upancy mod	e, readings	within range						
	In	non-occupa	ncy mode, s	ystem alarm						
	In non-occ	upancy mod	e, readings v	within range						
			Occupan	cy Mode with	out Source	s (Check if	alarms) -	6kV		
	Poi	nt 1	Poi	int 2	Poir	nt 3	Poi	nt 4	Point 5	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1										
2										
3									ļ	
4										
5		ļ!								
0										
/		<u> </u>								
o Q		<u> </u>								
10										
Alarme		ł								
Alannis		ļi								
			Occupancy	Mode with Sc	urces (Che	ck if out of	ftolerance	) - 6kV		
	Poi	nt 1	Poi	int 2	Poir	nt 3	Poi	nt 4	Poi	nt 5
	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron
1										
2		1								
3		1								
4										
5										
6										
7										
8										
9		ļ								
10										
Mean	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

TEST AND EVALUATION PROTOCOL	<b>TEP NO.</b> N42.38	PREPAR DIV682	ED BY:
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			Non-Occupa	ancy Mode w	ithout Sour	ces (Check	if alarms)	- 6kV		
	Poi	nt 1	Poi	nt 2	Poir	nt 3	Poi	nt 4	Poi	nt 5
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1										
2										
3										
4										
6										
7										
8										
9										
10										
Alarms										
		No	on-Occupanc	y Mode with	Sources (C	heck if out	of toleran	ce) - 6kV		
	Poi	nt 1	Poi	nt 2	Poir	nt 3	Poi	nt 4	Poi	nt 5
	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron
1										
2										
3										
4										
5										
7										
8										
9										
10										
Mean	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
			6kV-Test	Report						
		-			Yes	No				
		In occupa	ncy mode, s	ystem alarm						
	IN OCCL	upancy mod	e, readings	within range						
	In		nov modo is	vetom alarm	[					
	In non-occi	inancy mod	e readings	within range						
	in non-occe		e, readings	and the second se						
	Comments:									
<u>^-</u>	mplated hor						Date			
	inpleted by:			1			Date:			
R	eviewed by:						Date		L	
							Dui0.			



**TITLE: Spectroscopy- Based Portal** 

Security

TEP NO.

**PREPARED BY:** 

		Sectio	on 8.2 F	Radio F	requen	cy (RF)			
			Test D	ata anc	I Repo	rt			
Instru	ment:								
M	lodel:				Seria	I Number:			
Date Perfor	rmed:				Test	Location:			
Require	ment:	The monitor should not be affected by RF fields over the frequency range of 20 MHz to 250 MHz at an intensity of 10 volts per meter (V/m).							z to 2500
	Note:	Comments	are require	ed when the	e requireme	nt is not ver	ified.		

Terr	perature:		°C	Humidity:		%	Pressure:	in Hg.
Test Equipm	ent Used:							
	Fre	quency So	can Obser	vations Wit	thout Sour	ces		

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		With Cs-1	37 and Cf-	252 Source	S		
	Nominal						
	No RF	Gamma So	ource Data:				
	Gamma						
1		Neutron So	ource Data:				
2							
3							
4							
5		Accentan	co Rango	(Gamma)			
6			to				
7		$\frac{\pi D V / 0!}{15\%}$	10	$\frac{\pi D 1 V / 0}{150}$	()		
		1000 (-1378)		nigh (+157	<i>b )</i>		
0		<b>A</b>	aa Dawwa	(NI a sufficience)			
9		Acceptan	ce Range	(Neutron)			
10		#DIV/0!	tO	#DIV/0!			
Mean	#DIV/0!	low (-15%)		high (+15%	<b>b</b> )		
STD	#DIV/0!						
COV	#DIV/0!						
		Freque	ency Scan	Observatio	ons with S	ources	
	Nominal						
	No RF						
	Neutron						
1	Neution						
2							
3							
4							
5							
6							
7							
8							
9							
10							
Mean	#DIV/0!						
STD	#DIV/0!						
COV	#DIV/0!						
G	omments:						
Com	pleted by:			Date:			
Rev	iewed by:			Date:		-	
				1			I



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	Sectio	า 8.3	Radiated	l Emiss	ions			
	Т	est C	Data and I	Report				
Instrument:								
Model:				S	erial Number:			
Date Performed:				1	Test Location:			
Requirement	The emiss than what i	ion limi s show	ts when measu n below:	red at three	meters from the	monitoring	system sha	III be less
			Emission Frequency Range		Field Strength			
			(MHz)		(micro			
			. ,		volts/meter)			
			30 – 88		100			
			88 – 216		150			
			216 – 960		200			
			>960		500			
Note:	Comments	are re	quired when th	e requirem	ent is not verifie	d.		
Occupancy operations								
			Test Rep	oort				
				Vaa	Na			
	Emiss	ions w	ere within	res	INO			
	aco	eptable	e limits			ļ		

Z	TEST AND EVALUATION PROTOCOL	<b>TEP NO.</b> N42.38	<b>PREPARED BY:</b> DIV682		
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lon-occupancy oper	rations					
				Test Re	port	
					Ves	No
		Emissions were with acceptable limits		ere within	103	
Com	ments:					
Complet	had by u					Data
Complet	leu by.					Date.
Review	ed by:					Date:



Monitors Used for Homeland

**TITLE: Spectroscopy- Based Portal** 

Security

Sec	tion 8.4 Co	nducteo Ra	d Disturb adio Frec	ances Ir quencies	nduced S	by Bursts	and	
		Tes	st Data a	nd Repo	ort			
Instrument	•							
Model				Seria	l Number:			
Date Performed	:			Test	Location:			
Requirement	: The monitor shou external conduct	uld not be aff ing cable.	fected by RF 1	ields that ca	n be condu	cted onto the mo	pnitor throu	gh an
Note	: Comments are re	equired wher	the requirem	ent is not ver	ified.			<u> </u>
Temperature		°C	Humidity:		%	Pressure:		in Hg.
ccupancy Mode								
Test	Equipment Used:							
	Frequency Sc	an Observa	tions Withou	It Sources				
	. ,							

NIST	TEST AND EVALUATION PROTOCOL	<b>TEP NO.</b> N42.38	<b>PREPARED BY:</b> DIV682		
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		With C	s-137 and C	Cf-252 Sourc	es				
	Nominal		Gamma	Source Data:					
	No RF								
	Gamma		Neutron	Source Data:					
1		(add units)							
2									
3			Accepta	nce Range (	(Gamma)				
4			#DIV/0!	to	#DIV/0!				
5			low (-15%)		high (+15%)				
6			, ,		,				
7			Accepta	nce Range (	(Neutron)				
8			#DIV/0!	to	#DIV/0!				
9			low (-15%)		hiah (+15%)				
10			- ( )		5 (,				
Mean	#DIV/0I								
STD	#DIV/0:								
COV	#DIV/0:								
000	#017/0!		E			ono with f			
			Fre	quency Sca	in Observati		ources	l	
	No. 1. 1								
	Nominal								
	No RF								
	Neutron								
1		(add units)							
2									
3									
4									
5									
6									
7									
8									
9									
10									
Mean	#DIV/0!								
STD	#DIV/0!								
COV	#DIV/0!								
001	<i></i>								
Nor Co									
NON-OCCU	pancy Mo	ue							
	<b>-</b>								
	iest E	quipment Used:							
								ļ	
		Frequency Sca	an Observa	tions Withou	ut Sources				
	1								
	1								
	1								
	1							1	
	1								
	I			1					
1									

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		With	With Cs-137 and Cf-252 Sources						
	Nominal		Gamma	Source Data:					
	No RF								
	Gamma		Neutron	Source Data:					
1		(add units)							
2		(uuu unito)							
3			Accenta	nce Range (	(Gamma)				
4			#DIV/01	to	#DIV/01			_	
5			low (-15%)		$\frac{101170}{100}$			_	
6			1011 (1070)		(* 1070)				
7			Accenta	nce Range (	(Neutron)				
8				to					
9			How (-15%)		$\frac{\#D1770!}{15\%}$				
10			1000 (=1070)		nign (* 1070)				
Moon									
wear	#DIV/0!								
510	#DIV/0!								
00	#DIV/0!		_				5	_	
			Fre	quency Sca	n Observati	ons with s	Sources	_	
	Nominal								
	No RF								
	Neutron								
1		(add units)							
2									
3									
4									
5									
6									
7									
8									
9									
10									
Mean	#DIV/0!								
STD	#DIV/0!								
COV	#DIV/0!								
	1								
C	omments:								
							1	_	
								-	
			-					-	
								_	
								-	
Com	nleted by:				Date			-	
	p.0.00 by.				Date.			-	
Rev	iewed hv:				Date			-	
1100	ieweu by.				Date.			_	



Monitors Used for Homeland

**TITLE: Spectroscopy- Based Portal** 

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			Section	on 8.5 M	agnetic	: Field			
			Tes	st Data a	nd Rej	port			
					-				
I	nstrument:								
	Model:				Seria	al Number:			-
Date F	'erformed:				les	t Location:			
Rec	uirement:	The monito	r should be	unaffected b	v a 30 Amp	eres/m (A/n	n) 60 Hz ma	anetic field.	_
		NOTE 1	A/m is equiv	alent to a fre	e space inc	duction of 1.	26 mTesla.		
						1			
	Note:	Comments	are required	d when the re	equirement	is not verifie	d.		
			·		•				
Ter	nperature:		°C	Humidity:		%	Pressure:		in Hg.
To at F									
Ieste	quipment:								
Gamma So	urce Data:								
- Cuinia CC									
Neutron So	urce Data:			·		•			
			<u>Test Da</u>	ata with Sou	irces				
	Gamma	Neutron							
	Response	Response							
1		•		Accepta	nce Range -	Gamma			
2									
3				#DIV/0!	to	#DIV/0!	(add units)		
4				-15%		+15%			
5									
6				Accepta	nce Range -	Neutron			
/				#DIV/01	4.5	#DIV/01	(add unite)		
8		ļ		-15%	10	+15%	(auu units)		
10				-13/0		15/0			
Mean	#DIV/01	#DIV/01							
STD	#DIV/0!	#DIV/0!							
CV	#DIV/0!	#DIV/0!							

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		Initial Or	ientation			Second C	rientation		
	Nom	ninal	30	A/m	Non	ninal	30	A/m	
	Zero In	ntensity 60 Hz		Zero Ir	tensity	60 Hz			
	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	
1									
2									
3									
4									
6									
7									
8									
9									
10									
Mean	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
			Test Data	a without S	ources				
			<u></u>						
			Initial Or	rientation			Second Ori	ientation	
			30	A/m			30 A	/m	
		0	60	Hz		0	-Iz		
		Gamma	Alarms	Neutror	i alarms	Gamma	Alarms	Neutron alarms	
		res	NO	res	NO	res	NO	res	NO
	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	Q								
	10								
Numbe	r of alarma								
INUITIDE									

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Comments:							
Com	pleted By:		 		Date:		
Reviewed By:			 	Date:			



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		•								
		Sect	ion 8.6 S	Surges an	d Oscilla	tory Way	ves			
	1		lest	Data and	Report					
	Instrument:									
	Model:				Seria	I Number:				-
Da	te Performed:				Tes	t Location:				
		<b>The second term</b>		<b>6</b>						-
	Requirement:	The monitor	Should not be	e affected by surg	jes or oscillato	ry waves of up	o to 2 kV that are	classified	as ring	
				100 at 1.2,00 po t	und 0/20 po.					
										-
	Note:	Comments	are required	when the require	ement is not ve	erified.			·	
	<b>T</b>		° <b>0</b>			0/	D		in the	
	remperature:			Humidity:		70	Pressure:		in Hg.	
Te	st Equipment:									
Gamma	a Source Data:									
Neutror	Source Data:									
								A -		
								Gar	nma Backor	ound
	Pre-T	est		Pre-T	est			#DIV/0!	to	#DIV/0!
	Ambient	Gamma		Ambient	Neutron					
	Gamma			Neutron	Response			-15%		+15%
	Background			Background						
4			(add unite)			(add unite)		Accort	ance Range	- Gamme
2								Accepta	nice nange	Janna
3								#DIV/0!	to	#DIV/0!
4								-15%		+15%
5										
6				ļļ						
7								Ac	trop Booker	inge
8								#DIV/01	to	
10								-15%		+15%
Mean	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!					
STD	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!			Accepta	ance Range	- Neutron
COV	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!					
								#DIV/0!	to	#DIV/0!
								-15%		+15%

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			<u>Occu</u>	pancy Mode						
				Cs-137	Source		Cf-252 So	urce		
	Without Sour if alar	rces (Check ms)		With Sources of tole	(Check if out rance)		With Sources out of tole	(Check if rance)		
	Combination Wave	Ring Wave		Combination Wave	Ring Wave		Combination Wave	Ring Wave		
1						(add units)			(add units)	
2										
3										
4										
5										
6										
7										
8										
9										
10										
10			Mean	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		
			STD	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		
			COV	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		
			-		-			-		
			Non-Oc	cupancy Mode						
				Cs-137	Source		Cf-252 So	ource		
	Without Sour	ces (Check		With Sources (Check if out			With Sources (Check if			
	Combination			Of tole	rance)		out of tolerance)			
	Wave	Ring Wave		Wave	Ring Wave		Wave	Wave		
1						(add units)			(add units)	
2										
3										
4										
5										
6										
7										
Q										
10										
10			Moon	#DIV/01	#DIV/01		#DIV/01	#DIV/0!		
			STD	#DIV/01	#DIV/01		#DIV/01	#DIV/01		
			COV	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!		

TEST AND EVALUATION PROTOCOL	<b>TEP NO.</b> N42.38	PREPAR DIV682	ED BY:
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						L
					Yes	No
		In occupa	ncy mode,	, system alarm		
	In occi	upancy mod				
				1		
	In In In	non-occupa	ncy mode,	, system alarm		
	In non-occi	upancy mod	e, reading	s within range		
Comments:						
e e i i i i i i i i i i i i i i i i i i						
Completed by:						Date:
Reviewed by:						Date:

TEST AND EVALUATION PROTOCOL	<b>TEP NO.</b> N42.38	PREPAR DIV682	ED BY:
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			Section 9.1 Vibration						
			Test Data and Report						
Instrument:				Sorial Nu	mbor				
Date Performed:				Test Loc	ation:				
Date i chonned.				TUSELOC	cation.				
Requirement:	The monitor	shall function	normally when exposed to vibrations a	issociated v	with equ	ipment insta	alled in non	-weather	
	should not b	e affected by	o 0.5 gn over a frequency range from 10 exposure (e.g., solder joints shall hold:	nuts and bo	nz. The olts shal	I not come l	lation of the	emonitor	
		· · · · · ,	· · · · · · · · · · · · · · · · · · ·				· · · · ,		
N. A	0								
Note:	Comments a	are required	when the requirement is not verified.						-
	ĺ	Î	i i		ĺ				
Temperature:		°C	Humidity:	%		Pressure:		in Hg.	
Test Equipment:									
Commo Dookarour	d Deedinau		(odd upita)	Nau	tron De		Deeding		(odd upita
Gamma Backgrour	ia Reading:			Neu		ickground	Reading:		(auu units
Gamma Source Data:									
Neutron Source Data:									
			To at Data						
			<u>Test Data</u>						
	F	Readings w	thin acceptance range with source	es present	t				
	Pre-	Test				Post	Test		
	Gamma	Neutron	(odd upito)			Gamma	Neutron	(add unita)	
1					1			(add units)	
3					3				
4					4				
5					5				
6					6				
7					7				
0					0				
10									
Mean	#DIV/0!	#DIV/0!			Mean	#DIV/0!	#DIV/0!		
STD	#DIV/0!	#DIV/0!			STD	#DIV/0!	#DIV/0!		
CV	#DIV/0!	#DIV/0!			CV	#DIV/0!	#DIV/0!		
A		Camm				a Dr.	Maurine		
Acceptan	ce kange -	Gamma		AC	ceptan	ce kange	- Neutron		
#DIV/0!	to	#DIV/0!	(add units)	#E	DIV/0!	to	#DIV/0!	(add units)	)
-15%		+15%		-	-15%		+15%	,	
									1

TEST AND EVALUATION PROTOCOL	<b>TEP NO.</b> N42.38	PREPAR DIV682	ED BY:
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			Alarms with no source pres	ent				
	Gamma	a Alarms				Neutror	Alarms	
	Yes	No				Yes	No	
1					1			
2					2			
3					3			
4					4			
5					5			
6					6			
7					7			
8					8			
9					9			
10					10			
Number of alarms				Numbe	or of alarms			
			Test Report	N N				
		D:14		Yes	NO			
			e system alarm during the test	?				
\\/heret		where the	post-test readings within range	?				
vv nere t	nere any me	echanical dar	hage and/or loose components	?				
Commontor								
Comments.								
Completed by:						Date:		
Reviewed by:						Date:		

TEST AND EVALUATION PROTOCOL	<b>TEP NO.</b> N42.38	<b>PREPAR</b> DIV682	ED BY:
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		5	ection 9.	2 Microp	honics/l	mpact				
			Test	Data and	Report					
	Instrument									
	Model:				Se	rial Number <sup>.</sup>				
D	ate Performed:				Te	est Location:				
	Requirement:	The monitor intensity sha 1.4 m/s over	shall be unaff arp contacts a a distance of	ected by micro at energies of u f 0.1 m.	phonic condit p to 1.0 J. 1.0	ions such as t J is equivaler	those that n ht to a mass	nay occur f of 1 kg m	from low- oving at	
	Note:	Comments a	are required w	hen the require	ement is not ve	erified.				
т	est Equipment:									
Gan	nma Backgrour	nd Reading:		(add units)		Neutron B	ackground	Reading:		(add units)
	Temperature:		°C	Humidity:		%	Pressure:		in Hg.	
Cam	ma Source Data:									
Gam										
Neut	ron Source Data:									
Neut	ron Source Data: Pretest Response				Pretest Response			Acceptar	nce Range	- Gamma
Neut	ron Source Data: Pretest Response Gamma				Pretest Response Neutron			Acceptar #DIV/0!	ice Range to	- Gamma #DIV/0!
Neut 1	ron Source Data: Pretest Response Gamma	(add units)		1	Pretest Response Neutron	(add units)		Acceptar #DIV/0! low	ice Range to	- Gamma #DIV/0! high
Neuti 1	ron Source Data: Pretest Response Gamma	(add units)		1	Pretest Response Neutron	(add units)		Acceptar #DIV/0! low	ice Range to	- Gamma #DIV/0! high
Neut	ron Source Data: Pretest Response Gamma	(add units)		  1  3	Pretest Response Neutron	(add units)		Acceptar #DIV/0! low	ice Range to	- Gamma #DIV/0! high
Neut	ron Source Data: Pretest Response Gamma	(add units)		1 1 2 3 4	Pretest Response Neutron	(add units)		Acceptar #DIV/0! low	to	- Gamma #DIV/0! high
Neut	ron Source Data: Pretest Response Gamma	(add units)		1 1 2 3 4 5	Pretest Response Neutron	(add units)		Acceptan #DIV/0! Iow Acceptan	to	- Gamma #DIV/0! high
Neut 1 2 3 4 5 6	ron Source Data: Pretest Response Gamma	(add units)		1 1 2 3 4 5 6	Pretest Response Neutron	(add units)		Acceptar #DIV/0! low Acceptar #DIV/0!	to to to ce Range to	- Gamma #DIV/0! high - Neutron #DIV/0!
Neut 1 2 3 4 5 6 6 7	ron Source Data: Pretest Response Gamma	(add units)		1 1 2 3 3 4 5 6 7 8	Pretest Response Neutron	(add units)		Acceptar #DIV/0! low Acceptar #DIV/0! low	to to nce Range to	- Gamma #DIV/0! high - Neutron #DIV/0! high
Neut 1 2 3 4 5 6 6 7 8	ron Source Data: Pretest Response Gamma	(add units)		1 1 2 3 4 5 6 7 8 0	Pretest Response Neutron	(add units)		Acceptar #DIV/0! low Acceptar #DIV/0! low	to to nce Range to	- Gamma #DIV/0! high - Neutron #DIV/0! high
Neuti 1 2 3 4 5 6 6 7 8 9 9	ron Source Data: Pretest Response Gamma	(add units)		1 1 2 3 4 5 6 7 8 9 10	Pretest Response Neutron	(add units)		Acceptar #DIV/0! low Acceptar #DIV/0! low	nce Range to nce Range to	- Gamma #DIV/0! high - Neutron #DIV/0! high
Neut 1 2 3 4 5 6 7 8 9 9 10 Mean	ron Source Data: Pretest Response Gamma 	(add units)		1 1 2 3 4 5 6 7 8 9 10 Mean	Pretest Response Neutron	(add units)		Acceptar #DIV/0! low Acceptar #DIV/0! low	nce Range to nce Range to	- Gamma #DIV/0! high - Neutron #DIV/0! high
Neut 1 1 2 3 4 5 6 7 8 9 10 Mean STD	ron Source Data: Pretest Response Gamma 	(add units)		1 1 2 3 4 5 6 7 7 8 9 10 0 Mean STD	Pretest Response Neutron #DIV/0!	(add units)		Acceptar #DIV/0! low Acceptar #DIV/0! low	to to to to	- Gamma #DIV/0! high - Neutron #DIV/0! high

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Test Data - Occupancy Mode								
			Wit	hout Sources	<u>s</u>			
	Impact	Cida	No. 1	Side		Cide I		
	Number	5108	NO. 1 Record if ma	Side	NO. 2		NO. 3	
		Gamma	Neutron	Commo Neutron Commo			Neutron	
	1	Gamma	Neution	Gaiiiiia	Neution	Gainna	Neution	
	2							
	3							
	No. of alarms							
	Impact							
	Number	Side	No. 4	Side	No. 5	Side I	No. 6	
			Record if mo	onitor alarm	during the tes	st (Yes/No)		
		Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	
	1							
	2							
	3							
	No. of alarms							
			<u>w</u>	ith Sources		1		
	lana a t							
	Impact	0:44		<b>O</b> ida		Cide I		
	Number	5100	Rooponoo Af	Side No. 2		Side No. 3		
		Gamma	Neutron	Gamma	Noutron	Gamma	Neutron	 
	1	Gamma	Neuron	Gainna	Neution	Gainna	Neuron	
	2							
	3							
	No. of alarms							
	Impact							
	Number	Side	No. 4	Side	No. 5	Side I	No. 6	
			Response Af	ter Each Imp	act			
		Gamma	Neutron	Gamma	Neutron	Gamma	Neutron	
	1							
	2							
	3							
	No. of alarms							

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Non-Occup	oancy Mode									
T	et Equipmont:									
	est Equipment.									
Gam	nma Backgroun	d Reading:		(add units)		Neutron B	ackground	Reading:		(add units)
	Temperature:		°C	Humidity:		%	Pressure:		in Hg.	
Gamı	ma Source Data:									
Neutr	ron Source Data:									
	Pretest Response				Pretest Response			Acceptar	nce Range	- Gamma
	Gamma				Neutron			#DIV/0!	to	#DIV/0!
1		(add units)		1		(add units)		low		high
2				2						
3				3						
5				5				Acceptar	ice Range	- Neutron
6				6		1		#DIV/0!	to	#DIV/0!
7				7				low		high
8				8						
9				9						
10	#DIV//01			10	#DN//01					
Mean	#DIV/0!			Iviean	#DIV/0!	-				
COV	#DIV/0!			COV	#DIV/0!					
001	#01070:			001	#DIV/0:					
			<b>T</b>							
			Test Data	- Non-Occu	pancy wood	<u></u>				
			Wit	hout Sources	•					
			<u>vvii</u>	nout Sources	<u>s</u>					
	Impact									
	Number	Side	No. 1	Side	No. 2	Side	No. 3			
			Record if mo	onitor alarm	during the te	st (Yes/No)				
		Gamma	Neutron	Gamma	Neutron	Gamma	Neutron			
	1									
	2									
	No of alarms									
						l				
	Impact									
	Number	Side	No. 4	Side	No. 5	Side	No. 6			
			Record if mo	onitor alarm	during the te	st (Yes/No)				
		Gamma	Neutron	Gamma	Neutron	Gamma	Neutron			
	1									
	2									
	J No of clarms							ļ		
	NO. OF ATARMS									

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With Sources								
Impact								
Number	Side	No. 1	Side	No. 2	Side	No. 3		
		Response Af	iter Each Imp	act				
	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron		
1								
2								
3								
No. of alarms								
Impact								
Number	Side	No. 4	Side	No. 5	Side	No. 6		
		Response Af	ter Each Imp	act				
	Gamma	Neutron	Gamma	Neutron	Gamma	Neutron		
1								
2								
3								
No. of alarms								
		Test F	Report		č			
				Yes	No			
	In occupa	ncy mode, s	ystem alarm					
In occu	upancy mod	e, readings v	within range					
In	non-occupa	ncy mode, s	ystem alarm					
In non-occu	upancy mod	e, readings v	within range					
Comments:								
Completed by:						Date:		
 Reviewed by:						Date:		



**Sections 10 - Documentation Test Data and Report** Instrument: Serial Number: Model: Date Performed: Test Location: Requirements: 10. 1 Type test report The manufacturer shall make available, at the request of the purchaser, the report on the type tests performed to the requirements of this standard. 10.2 Report The manufacturer shall provide the following information, as a minimum: - Contact information for the manufacturer including name, address, telephone number, fax number, e-mail address, etc. - Type of portal monitor, detector, and types of radiation the monitor is designed to measure - Mounting distance between detection assemblies, as appropriate - Power supply requirements - Results of tests performed to this standard Recommended operational parameters such as: detector response, false alarm probability, alarm thresholds, operating parameters, and libraries - Complete description of the evaluated monitor - Enclosure specification classification - Inclusion of any hazardous material that may require additional regulation (such as radionuclide check source) - List of radionuclides that are identified by the monitor - Over-range exposure rate values for gross counting and identification 10.3 Operation and maintenance manual The manufacturer shall supply an operation and maintenance manual containing the following information to the user: - Operating instructions and restrictions Module connection schematic Electrical connection schematic Spare parts list Troubleshooting guide - Description and protocol for communication methods of transmitting and receiving data Note: Only one data sheet per model is required. Comments are required when the requirement is not verified.

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			<u> </u>					
							Yes	No
		Did the manufa	acturer provide	a report on the	type tests	performed?		
		Bid the manale				pononnou.		
			Was contac	ct information pr	ovided in th	ne manual?		
		<b>D</b> : 1.11						
		Did the	manual describ	be the type of m	nonitor and	detectors?		
	V	Vas the mountin	ng distance bet	ween detection	assemblie	s provided?		
	·							
			Were the	power supply re	equirement	s provided?		
	Were results of test performed to this standard provided?							
		1	Moro rocommo	and an arating	paramotor	p provided2		
	were recommended operating parameters provided?							
		Was a cor	mplete descript	tion of he evalua	ated monito	r provided?		
			W	ere enclosure s	pecification	n provided?		
	10/	as information a	bout any inclus	aion of bozarda	un motorial	p provided2		
	VV			SIGH OF Hazardou		s provided?		
	Was	s the list of radio	onuclides that a	are identified by	the monito	r provided?		
	Were the over	er-range exposur	re values for gro	oss count and i	dentificatio	n provided?		
		Were manuals v	with operating in	nstructions and	restriction	s provided?		
			and operating it					
		Were mar	nuals with mod	lule connection	schematics	s provided?		
				· • •	<u> </u>			
		were manu	lais with electri	ical connection	schematics	s provided?		
			Were m	anuals with spa	are parts lis	t.provided?		-
			Were m			t provided.		
		V	Nere manuals v	with troubleshoe	oting guide	s provided?		
	Did the manual provide a description and protocols for communication methods of							
	transmitting and receiving data?							
	ļ,					· · · · ·		
mments								
С	ompleted by:					Date:		
	Reviewed by:					Date		