



U.S. NUCLEAR REGULATORY COMMISSION

# REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 5.7  
(Task SG 909-4)

## ENTRY/EXIT CONTROL FOR PROTECTED AREAS, VITAL AREAS, AND MATERIAL ACCESS AREAS

### A. INTRODUCTION

Part 73, "Physical Protection of Plants and Materials," of Title 10, Code of Federal Regulations, specifies performance requirements for the physical protection of special nuclear materials and associated facilities. Section 73.20, "General Performance Requirements," describes the general performance objective and requirements that must be met through the establishment of a physical protection system. Performance capabilities necessary to meet the requirements of § 73.20 are described in § 73.45, "Performance Capabilities for Fixed Site Physical Protection Systems." While detection and control requirements are specified throughout the capability statements, specific entry/exit control techniques are required under three capabilities. Paragraph 73.45(b) specifies preventing "unauthorized access of persons, vehicles and materials into material access areas and vital areas." A physical protection system must achieve this by using entry controls, among other things. Paragraph 73.45(e) permits "removal of only authorized and confirmed forms and amounts of strategic special nuclear material from material access areas." The system must achieve this capability by providing detection subsystems and procedures to detect, assess, and communicate attempts at unauthorized removal. Paragraph 73.45(f) provides for ensuring only authorized access to the protected area and requires, in part, the use of entry controls to meet the capability. Finally, § 73.46, "Fixed Site Physical Protection Systems, Subsystems, Elements, Components, and Procedures," outlines typical specific safeguards measures that will often be included in an overall system that meets the requirements of Sections 73.20 and 73.45.

A significant element of the physical protection system is the control of the entry and exit of personnel, vehicles, and material. This control includes personnel identification

\*The substantial number of changes in this revision has made it impractical to indicate the changes with lines in the margin.

and entry/exit control systems and procedures for searching individuals, vehicles, and materials. Entry and exit control procedures are used to provide assurance that only authorized individuals are allowed access to protected areas (PAs), vital areas (VAs), and material access areas (MAAs). Entry search procedures, in conjunction with other protection elements, are used to provide assurance that firearms, explosives, and incendiary devices are not introduced into the subject areas. Exit search procedures from material access areas are used to provide assurance that strategic special nuclear material (SSNM) is not being covertly removed.

This guide describes measures the NRC staff considers acceptable for implementing entry/exit control requirements at facilities subject to the above regulatory requirements.

### B. DISCUSSION

The objective of controlling access to protected areas, vital areas, and material access areas is to ensure that only authorized persons with legitimate need be allowed access to such areas. The objective of searching vehicles, personnel, or packages prior to entry into protected or material access areas is to prevent the introduction of firearms, explosives, or incendiary devices that could be used to commit radiological sabotage or aid in the theft of SSNM. The objective of searching all personnel and material exiting material access areas is to provide a means of detecting attempted theft or diversion of concealed SSNM.

Entry control involves the following functions:

1. Identification and authorization check,
2. Entry to control point,
3. Weapons search,
4. Explosive/incendiary device search,
5. Badge exchange, if used, and
6. Admittance to area or denial and notification to security force of a problem.

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Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience. This guide was revised as a result of substantive comments received from the public and additional staff review.

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The identity of an individual can be verified by determining something *about* an individual, such as facial features; by determining something *possessed* by an individual, such as a coded badge; or by determining something *known* to an individual, such as a numerical code. By using combinations of the above three identity verification processes, more reliable identity verification can be obtained. Such identification procedures can be accomplished by attendant security personnel or by the use of identification equipment such as video comparator systems.

Searching of incoming personnel or material can be accomplished by a hands-on "pat-down" search, by the use of devices that detect unauthorized materials, by the use of a "strip" search, or by a combination of all three. Entry searches that use equipment to perform the search function, such as metal or explosives detectors, are preferred as they minimize the imposition of a hands-on or strip search.

Exit searches, which are conducted to ensure that concealed SSNM is not removed from material access areas, should use both special nuclear material (SNM) detection equipment and metal detection equipment to provide greater confidence that either shielded or unshielded material could be detected. All materials leaving the material access area should undergo such a search.

Direct responsibility for controlling the entry and exit of personnel, vehicles, and materials normally resides with members of the security organization. They should be adequately trained in operation of entry/exit control and search equipment and procedures in accordance with Appendix B, "General Criteria for Security Personnel," to 10 CFR Part 73.

Extensive discussions and descriptions of various alternative equipment and procedures for use in controlling entry and exit and for conducting searches of personnel, vehicles, and materials can be found in NUREG-0509, "Bibliography of Technical Guidance for the Physical Protection Upgrade Rule Requirements for Fixed Sites."<sup>1</sup>

For the purpose of this guide the following definitions are provided:

1. *Guard* means a uniformed individual armed with a firearm whose primary duty is the protection of special nuclear material against theft and the protection of a plant against radiological sabotage.

2. *Watchman* means an individual, not necessarily uniformed or armed with a firearm, who provides protection for a plant and the special nuclear material therein in the course of performing other duties.

<sup>1</sup> NUREG-0509 is available for public inspection or copying for a fee at the NRC's Public Document Room, 1717 H Street, NW, Washington, D.C. Copies may be purchased directly from the NRC by writing to the Publications Sales Manager, Distribution Services Section, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555 or the National Technical Information Service, Springfield, Virginia 22161.

3. *Escort* means a member of the security organization or other designated individual responsible for accompanying those personnel not allowed unescorted access within a protected area. An escort is not required to possess technical knowledge of processes or equipment as is required by the two-man concept.

## C. REGULATORY POSITION

### 1. PROTECTED AREAS

#### a. *Entry Identification and Authorization*

At each entry/exit control point (EECP) into a protected area, a means of establishing the identity and access authorization of incoming individuals should be provided. Acceptable means of identity verification are facial recognition and positive comparison to an authorized picture badge. Such identity verification can be performed by attendant security personnel or by the use of remotely viewed closed circuit television (CCTV) systems that display an acceptable image of the individual's face and compare it to an image of a picture badge or a stored image of that individual's face. The identification/verification procedure and confirmation of entry authorization should be performed prior to any search function. To facilitate both identification and search functions, entry and exit traffic should be separated by physical barriers, and employee and visitor traffic should be processed separately.

#### b. *Personnel Search*

A search of entering personnel for firearms, explosives, or incendiary devices should be conducted by use of both a firearms detector and an explosives detector. All incoming individuals not possessing a Department of Energy (DOE) material access authorization should undergo such a search. DOE couriers engaged in the transport of SSNM are exempt from such searches.

A sample of all individuals possessing DOE material access authorizations should be searched. The sample rate should be a minimum of 10%, with individuals selected randomly from all entering personnel who possess the necessary authorizations.

In the event that search equipment indicates the presence of firearms, explosives, or incendiary devices, the following actions should be taken:

1. The security personnel should request that the individual empty his or her pockets and again be tested by the search equipment. If the individual complies and after the equipment no longer indicates the presence of firearms or explosives and the contents of the pockets have been verified as not including firearms, explosives, or incendiary devices, the individual may be allowed to pass into the protected area.

2. If, however, the equipment continues to indicate the presence of firearms or explosives, a physical search should be made by one *unarmed* security person, while at

least one guard observes the search. An acceptable alternative to a hands-on search is a "strip search," which could be completed in the privacy of a separate searchroom and which should include the individual disrobing (except for underclothing) and submitting his or her clothing for inspection.

3. If an individual refuses to comply with either a hands-on or strip search or if a firearm, explosive, or incendiary device is found, entry should be denied.

4. If material of a suspicious and unknown nature is found, entry should be delayed until responsible security personnel are satisfied that the material is not of a threatening nature.

When the initial search uses hand-held detectors or is a hands-on search, firearms should be searched for first, as it is presumed that a concealed firearm is a more immediate danger to the searcher than concealed explosives or incendiary devices.

Entry into the protected area should be granted to individuals only after they have satisfactorily met the identification, authorization, and search requirements of 10 CFR Part 73. The opening to the last barrier to the PA should be controlled by an individual isolated within a bullet-resisting structure. Acceptable means to accomplish this are to provide a bullet-resisting booth meeting UL Level IV standards at the last barrier of the EECF for the individual who controls the opening to the PA or to have this opening controlled by the central alarm station (CAS) or secondary alarm station (SAS) operator or both.

#### *c. Package or Material Identification and Search*

At PA EECFs, all hand-carried packages should be searched by direct observation, by the use of firearms detectors or explosives detectors, or by the use of X-ray equipment for concealed firearms, explosives, incendiary devices or other items that could be used for theft or sabotage purposes. Packages carried by individuals who possess a DOE material access authorization may be excepted unless that person is one of the sample selected randomly to undergo an entry search, in which case any hand-carried packages should also be searched.

Hand-carried packages or materials that cannot be readily opened or otherwise cannot be effectively searched by direct observation should be submitted to suitable detection equipment, which may include X-ray devices. If the nature of the packaging interferes with effective operation of firearm or explosives detection equipment, X-ray should be used. Any item or material determined to be of a questionable nature by search personnel should not be allowed into the protected area until responsible security personnel are satisfied that the material is not of a threatening nature.

#### *d. Vehicle and Cargo Entry and Search*

All vehicles except DOE vehicles engaged in the transport of SNM and emergency vehicles responding to emergency conditions are required to be searched for unauthorized

personnel, firearms, explosives, and incendiary devices prior to entry into the protected area. The search should include the cab, engine compartment, undercarriage, and cargo area. (Refer to NUREG/CR-0485, "Vehicle Access and Search Training Manual,"<sup>2</sup> for details. A level I search should be conducted as a minimum.) The use of vehicle sally ports (secure access passageways) is an acceptable way to facilitate identification, control, and search functions.

All material or packages to be delivered into the PA are required to be identified and verified as an authorized delivery prior to entry. A sample of all such delivered packages or materials should be searched for firearms, explosives, or incendiary devices, the sample rate to be a minimum of 10%, with samples selected randomly from all such deliveries. Where size, weight, packaging, or other characteristics prohibit an effective search by direct observation, detection equipment, or X-ray, entry may be granted so long as:

1. The material is escorted to its destination by a member of the security organization,

2. The material is not initially offloaded or unpacked adjacent to a vital or material access area, and

3. Offloading and unpacking is observed by at least two authorized individuals, one of whom is a member of the security organization, for the purpose of ensuring that only authorized material has been delivered and that there are no concealed firearms, explosives, or incendiary devices.

#### *e. Entry and Search Aids*

The use of pedestrian and vehicle sally ports can provide an effective means of isolating, identifying, and searching individuals in a controlled area prior to allowing entry into the PA. By interlocking the first and second openings in the sally port so they cannot be opened simultaneously and by providing observation of entry, a positive means of preventing "piggybacking" is available.

Firearms detectors, whether of the hand-held or portal variety, should be capable of detecting with at least an 85% effective detection rate one of the following located anywhere on an individual: (1) Colt .25 automatic, (2) Titan .25 automatic, (3) General Precision Model 20-.22 caliber, (4) CDM .22 short, or (5) the calibration source specified in NILECJ-STD-0601.00, "Walk-Through Metal Detectors for Use in Weapons Detection."<sup>3</sup> The false alarm rate should

<sup>2</sup>NUREG/CR-0485 is available for public inspection or copying for a fee at the NRC Public Document Room, 1717 H Street, NW., Washington, D.C. Copies may be purchased for \$4.75 directly from NRC by sending check or money order, payable to Superintendent of Documents, to the Director, Division of Technical Information and Document Control, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. GPO Deposit Account holders may charge their order by calling (301) 492-9530. Copies are also available for purchase through the National Technical Information Service, Springfield, Virginia 22161.

<sup>3</sup>National Institute of Law Enforcement and Criminal Justice Standard 0601.00, Stock Number GPO-2700-00256, is for sale for 65 cents per copy by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

not exceed 10% when the detector sensitivity is adjusted to this detection level. The devices should be adjusted to discriminate between typical firearm and non-firearm masses of metal. One example of a testing method for demonstrating compliance with the detection rate is given in the Appendix to this guide. Other testing methods may be used if the methods are fully documented and approved by the NRC.

Explosives detectors, whether of the hand-held or portal variety, should be capable of detecting with at least a 90% effective detection rate dynamite, TNT, and similar nitrogen-containing compounds in a minimum amount of 200 grams. One example of a testing method for demonstrating compliance with the detection rate is given in the Appendix. Other testing methods may be used if the methods are fully documented and approved by the NRC. The false alarm rate should not exceed 1% when the detector sensitivity is adjusted to this detection level. If the search for explosives is to be performed directly by security personnel, it should be performed only after a search for firearms has been made.

A search dog may be capable of providing a satisfactory detection capability for firearms and explosives. If dogs are used, they should be individually tested to ensure their continued capability and reliability. As an animal may present unpredictable problems and weaknesses, a set of trained and tested backup individuals or other detection devices or equipment should be immediately available to serve as a substitute in the event of a dog's illness or other sign of abnormal behavior. A dog should be used only if it can be shown to detect firearms or explosives with equal or greater confidence than existing alternatives. A dog may be particularly useful in the search of vehicles or oversize packages. As the duration of a dog's effectiveness for performing search functions may be limited, it should be used only as a secondary aid.

Annunciation of metal and explosives detection equipment should be both aural and visual.

The EECF should be provided with one or more duress alarms that annunciate in both the CAS and SAS. Such alarms should be placed in a concealed location that can generally be reached by attendant security personnel and activated in an unobtrusive manner. An acceptable alternative to duress alarms that annunciate in the alarm stations is the use of duress alarms that are worn or carried by attendant security personnel and that can be activated unobtrusively. Such duress alarms should be worn or carried at all times when security personnel attend an EECF.

## 2. MATERIAL ACCESS AREAS

### *a. Entry Identification and Authorization*

Individuals desiring entry to material access areas should be verified as being on appropriate authorization schedules and should be identified by comparison of facial features to an authorized picture badge. An acceptable method of

verifying authorization is the use of a code intrinsic to the picture badge indicating that entry to MAAs is authorized.

At no time should a lone individual be allowed entry to an MAA or a vault. As a minimum, entry to an unoccupied MAA requires at least two individuals to meet the intent of the two-man concept.

### *b. Package or Material Identification and Search*

All packages and materials entering a material access area should be searched for firearms, explosives, and incendiary devices. Search procedures and equipment, as discussed previously, for use at protected area EECFs should be used. In the event that security search personnel are suspicious of the nature of any searched packages or material, entry should be delayed until the nature or identity of the package or material can be determined.

### *c. Entry and Search Aids*

Entry and search aids discussed in the section on protected areas are also applicable to EECFs at MAA boundaries. In addition, unmanned EECF doors should be alarmed and annunciate in both the CAS and SAS.

### *d. Exit Search for SSNM*

Prior to exit from an MAA, all individuals, vehicles, packages, and other materials are required to be searched for concealed SSNM. This search should be conducted using both metal detection and SNM detection equipment. The metal detection system used to search for concealed shielded SSNM should be capable of detecting with at least a 90% effective detection rate a minimum of 100 grams of nonferrous metal (shielding) concealed anywhere on an individual. One example of a testing method for demonstrating compliance with the detection rate is given in the Appendix to this guide. Other testing methods may be used if the methods are fully documented and approved by the NRC. The false alarm rate should not exceed 1% for that level of detection. SNM detection equipment should be capable of detecting plutonium, uranium-233, or uranium enriched to 90% in the uranium-235 isotope in accordance with the testing and operational requirements of Regulatory Guide 5.27, "Special Nuclear Material Doorway Monitor."

Individuals should undergo two separate searches prior to exiting an MAA. An acceptable method of conducting these searches is to require individuals to pass through two separate sets of metal and SNM detection equipment, each set monitored by a different member of the security organization. For individuals exiting an area that contains only encapsulated or alloyed SSNM, the second search may be made of a sampling of all individuals exiting the area, the sample rate to be a minimum of 10%, with individuals selected randomly to undergo the search.

If an SNM or metal detector is triggered by an individual attempting to exit an MAA EECF, the individual should be asked to remove all items from his or her pockets and again

pass through the detection equipment. If the detector still triggers, a hands-on or strip search should be conducted. In the event search personnel are unsure of the nature of an object or material uncovered during a search, the material or object should be confiscated and the individual's exit delayed until a determination can be made that the object or material is not SSNM or does not contain SSNM.

Vehicles, materials, or packages, including trash, uncontaminated wastes, tools, and other equipment should be searched with SSNM and metal detection equipment where appropriate. This search should be conducted by a team of at least two authorized and designated individuals who are not normally allowed access to the material access area in question. An acceptable means of accomplishing such searches for items too large to be accommodated in pedestrian EECPs is to provide a holding area within the MAA that can be isolated from other MAA activities when search personnel are conducting authorized searches.

*e. Accounting for Individuals in MAAs*

Procedures should be employed at MAA EECPs to account for the number and identity of individuals within the MAA. Manual or automated accounting procedures are equally acceptable so long as the procedures can determine at any given time that no lone individual is within the MAA. An attempted violation of the two-man concept should be detectable at the EECF, CAS, and SAS (e.g., if one of two individuals alone within an MAA attempts to exit without the other).

*f. Vaults*

Entry to vaults should be controlled so that individual identification and comparison to authorization schedules are accomplished prior to opening the vault door. The use of split-screen CCTV or CCTV and badge reader are acceptable means of establishing identification and authorization.

Entry control should ensure use of the two-man concept during entry and access to vaults and should ensure that the vault is monitored by CCTV in both alarm stations and at least one other continuously manned onsite location.

### 3. VITAL AREAS

Entry to vital areas should be controlled so that individual identification and comparison to authorization schedules are accomplished prior to entry into the area. Use of the two-man concept for entry control is recommended. The use of attendant security personnel, authorized escorts, or remotely viewed CCTV systems that compare a facial image to an authorized picture badge are all acceptable means of providing such control.

### 4. EMERGENCY PROCEDURES

Emergency procedures should be developed to deal with the possibility of failure of entry/exit detection and assessment equipment or emergency evacuation.

*a. Failure of Detection Equipment*

Provisions should be made to use alternative EECPs or backup detection equipment or security personnel and provide for rapid repair of malfunctioning detection equipment. Failure of detection equipment should not be allowed to compromise the effectiveness of required search procedures.

*b. Evacuation Procedures*

To the extent possible, and without compromising safety practices or considerations, procedures should be established to protect against the possibility of an emergency evacuation being used to remove SSNM from the facility or to gain unauthorized access to the facility. Such procedures should be part of the facility's contingency plan.

## VALUE/IMPACT STATEMENT

A separate value/impact analysis has not been prepared for the revision to this regulatory guide. The changes were made to make the guide consistent with the upgrade physical protection amendments to the regulations published in final form in the *Federal Register* of November 28, 1979 (44 FR 68184). A value/impact analysis prepared for the

proposed amendments was made available in the Commission's Public Document Room, 1717 H Street, NW., Washington, D.C., at the time the proposed amendments were published. This analysis is appropriate for the final amendments as well as for the regulatory guide revisions appropriate to those amendments.

## APPENDIX

### 1. BACKGROUND

The purpose of this appendix is to provide an example of a testing method for determining the detection capability of firearms, explosives, and nonferrous metal detectors. This example should not be interpreted as a regulatory requirement. Other testing methods for demonstrating compliance with the detection rates may be used if fully documented and approved by the NRC. The purpose of testing a detector is to ensure that the installed instrument is operating according to one of the three performance criteria stated below.

1. Firearms Detectors - Regulatory Position C.1.e of this guide states, in part, that firearms detectors should be capable of detecting firearms with at least an 85% effective detection rate.
2. Explosives Detectors - Regulatory Position C.1.e of this guide states, in part, that explosives detectors should be capable of detecting explosives with at least a 90% effective detection rate.
3. Nonferrous Metal Detectors - Regulatory Position C.2.d of this guide states, in part, that the metal detection system should be capable of detecting nonferrous metals with at least a 90% effective detection rate.

### 2. TESTING THE DETECTORS

There are at least two types of testing that should be conducted on the detectors: detection rate testing and operational testing. Detection rate testing should be conducted quarterly (approximately every 90 days) and is designed to determine whether the detector is operating in compliance with the appropriate performance criterion. Operational testing should be conducted daily or, preferably, at the beginning of each shift. Operational testing is designed to ensure that the detector is operating and that the detection rate has not decreased to below the performance criterion. Additionally, manufacturer's design specification testing could be conducted quarterly. If the detector does not meet the minimum performance levels for the detection rate testing and the operational testing given in the following two sections, then corrective actions should be taken. All tests, test results, and corrective actions should be documented. The documentation will establish the performance history for each detector, and the test results should be available for inspection and analysis.

#### 2.1 Detection Rate Testing

Detection rate testing should be conducted on each detector quarterly (approximately every 90 days) and is designed to determine whether the detector is operating in compliance with the appropriate performance criterion.

The performance criterion for firearms detectors is at least an 85% effective detection rate. The performance criterion for explosives and nonferrous metal detectors is at least a 90% effective detection rate. One example of a method for detection rate testing is outlined on the following pages. The testing methods for showing at least 85% and at least 90% effective detection rates are similar, the only difference being that more successful tests are required to demonstrate the higher detection rate. The security personnel should test each detector by having one of the members of the security organization walk through the detector carrying the appropriate test material.

#### 2.1.1 Firearms Detectors

For firearms detectors, test each detector 30 times.

1. If 29 or 30 of the 30 tests result in successful detections of the test material, the test results demonstrate a detection rate of at least 85%, with 95% confidence in this statement.

2. If 28 of the 30 tests result in successful detections of the test material, the detector should be checked for an obvious problem such as an incorrect setting, and 10 additional tests should be conducted. If all 10 tests result in successful detections, the detection rate testing can be ended for this detector for this quarter, since 38 successful detections out of 40 tests demonstrate compliance with the performance criterion. However, if only 9 out of the 10 tests are successful, 10 more tests should be conducted. All of these 10 tests must be successful detections to demonstrate compliance, since the cumulative number of successful detections must be at least 47 out of 50 tests in order to demonstrate at least an 85% detection rate, with 95% confidence.

3. If 27 of the 30 tests result in successful detections of the test material, the detector should be checked for an obvious problem such as an incorrect setting, and 20 additional tests should be conducted (two sets of 10 tests). If all 20 tests result in successful detections, then the detection rate testing can be ended for this detector for this quarter.

4. If 26 or fewer of the 30 tests result in successful detections of the test material, compliance with the performance criterion is not demonstrated.

Table 1, given below, shows in summary form the minimum number of successful detections for 30, 40, and 50 tests for which the lower one-sided confidence limit on the detection rate is at least 85%. See the appendices to Regulatory Guide 5.44, "Perimeter Intrusion Alarm Systems," particularly Appendix B, for the details of deriving these confidence limits.

Table 1

**SUMMARY OF TESTS TO SHOW EFFECTIVE DETECTION RATE OF 85%**

Total No. of Tests	Minimum No. of Successful Detections	Statement: The detection rate is at least __%, with 95% confidence
30	29	85.1
40	38	85.1
50	47	85.2

If the minimum number of successful detections given in Table 1 is not met, compliance with the performance criterion has not been demonstrated. The detector needs to be upgraded to increase the detection rate to the required level. After the detector has been upgraded (repaired, adjusted, or replaced), the testing procedure should be conducted again in order to demonstrate compliance with the performance criterion, beginning with the 30 tests. A table similar to Table 2 of this Appendix can be used for recording the test results.

Table 2

**DETECTION RATE TESTING RESULTS**

Firearms Detector at (location)

Quarter \_\_, 198\_\_

Date: \_\_\_\_\_

Time: \_\_\_\_\_

No. of Tests	No. of Successful Detections
30	__ (if 29 or 30, testing complete)
10	__
<b>Total</b>	<b>40</b> (if 38, testing complete)
10	__
<b>Total</b>	<b>50</b> (if 47, testing complete)

**2.1.2 Explosives Detectors and Nonferrous Metal Detectors**

For explosives detectors and nonferrous metal detectors, test each detector 30 times.

1. If 30 out of the 30 tests result in successful detections of the test material, the test results demonstrate a detection rate of at least 90%, with 95% confidence in this statement.

2. If 29 of the 30 tests result in successful detections of the test material, the detector should be checked for an obvious problem such as an incorrect setting, and 10 additional tests should be conducted. If all 10 tests result in successful detections, the detection rate testing can be ended for this detector for this quarter, since 39 successful detections out of 40 tests demonstrate compliance with the performance criterion. However, if only 9 out of the 10 tests are successful, 10 more tests should be conducted. All of these 10 tests must be successful detections to demonstrate compliance, since the cumulative number of successful detections must be at least 48 out of 50 tests in order to demonstrate at least a 90% detection rate, with 95% confidence.

3. If 28 of the 30 tests result in successful detections of the test material, the detector should be checked for an obvious problem such as an incorrect setting, and 20 additional tests should be conducted (two sets of 10 tests). If all 20 tests result in successful detections, the detection rate testing can be ended for this detector for this quarter.

4. If 27 or fewer of the 30 tests result in successful detections of the test material, compliance with the performance criterion is not demonstrated.

Table 3, given below, shows in summary form the minimum number of successful detections for 30, 40, and 50 tests for which the lower one-sided confidence limit on the detection rate is approximately 90% (at least 88%). See the appendices of Regulatory Guide 5.44, "Perimeter Intrusion Alarm Systems," particularly Appendix B, for the details of deriving these confidence limits.

Table 3

**SUMMARY OF TESTS TO SHOW EFFECTIVE DETECTION RATE OF ABOUT 90%**

Total No. of Tests	Minimum No. of Successful Detections	Statement: The detection rate is at least __%, with 95% confidence
30	30	90.5
40	39	88.7
50	48	87.9

If the minimum number of successful detections given in Table 3 is not met, compliance with the performance criterion has not been demonstrated. The detector needs to be upgraded to increase the detection rate to the required level. After the detector has been upgraded (repaired, adjusted, or replaced), then the testing procedure should be conducted again in order to demonstrate compliance with the performance criterion, beginning with the 30 tests. A table similar to Table 4 can be used for recording the test results.



Table 4

**DETECTION RATE TESTING RESULTS**

Explosives (or Nonferrous Metal) Detector at (location)

Quarter \_\_, 198\_\_

Date: \_\_\_\_\_

Time: \_\_\_\_\_

	No. of Tests	No. of Successful Detections
	30	__ (if 30, testing complete)
	10	__
<b>Total</b>	<b>40</b>	<b>__ (if 39, testing complete)</b>
	10	__
<b>Total</b>	<b>50</b>	<b>__ (if 48, testing complete)</b>

**2.2 Operational Testing**

Operational testing should be conducted daily or, preferably, at the beginning of each shift. Operational testing is designed to ensure that the detector is operating and that

the detection rate has not decreased to below the performance criterion. One example of a method for operational testing is outlined on the following pages. The testing method for operational testing is the same for firearms detectors, explosives detectors, and nonferrous metal detectors. The security personnel should test each detector by having one of the members of the security organization walk through the detector carrying the appropriate test material.

The operational testing on each detector should result in 100% detections of the test material. The test results should be documented on a success/failure basis. If the detector fails to detect the test material on an operational test, corrective actions should be taken and documented. For example, if the test of the detector results in no alarm (no detection), the detector should be checked for an obvious problem such as an incorrect setting and retested 4 more times during the same shift if possible. If all 4 of these tests result in alarms, the detector should be tested 5 more times during the same shift on the next day. If all these 5 tests result in alarms, the daily or once-per-shift testing schedule can be resumed, since the performance criterion (85% detection rate for firearms detectors or 90% detection rate for explosives detectors and nonferrous metal detectors) has been confirmed. If there were any failures to detect among the 9 additional tests, the detector should not be used until after it has been thoroughly checked, repaired if necessary, and retested according to the detection rate testing method to demonstrate that it is now detecting the test material at the rate specified by the appropriate performance criterion. A table similar to Table 5 can be used for recording the test results.

Table 5

**OPERATIONAL TESTING RESULTS**  
(Success = 1, Failure = 0)

Firearms (or Explosives or Nonferrous Metal) Detector at (location)

Week beginning \_\_\_\_\_, 198\_, (in Quarter \_\_, 198\_)

	Date	Time	Result	4 Retests	5 Retests	
<b>Monday</b>	- Shift 1	_____	_____	1 or 0	-, -, -, -	-, -, -, -
	- Shift 2		_____		-, -, -, -	-, -, -, -
	- Shift 3		_____		-, -, -, -	-, -, -, -
<b>Tuesday</b>	- Shift 1	.	.	.	.	.
	- Shift 2					
	- Shift 3					
<b>Wednesday</b>	- Shift 1	.	.	.	.	.
	- Shift 2					
	- Shift 3					
<b>Thursday</b>	- Shift 1	.	.	.	.	.
	- Shift 2					
	- Shift 3					
<b>Friday</b>	- Shift 1	.	.	.	.	.
	- Shift 2					
	- Shift 3					
<b>Saturday</b>	- Shift 1	.	.	.	.	.
	- Shift 2					
	- Shift 3					
<b>Sunday</b>	- Shift 1	.	.	.	.	.
	- Shift 2					
	- Shift 3					

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

OFFICIAL BUSINESS  
PENALTY FOR PRIVATE USE, \$300

POSTAGE AND FEES PAID  
U.S. NUCLEAR REGULATORY  
COMMISSION

