



U.S. NUCLEAR REGULATORY COMMISSION

REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 5.14
(Task SG 910-4)

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USE OF OBSERVATION (VISUAL SURVEILLANCE) TECHNIQUES IN 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." While detection and assessment requirements are specified throughout the capability statements, specific surveillance and monitoring techniques are required under two capability statements of § 73.45. Paragraph 73.45(c) permits only authorized activities and conditions within protected areas, material access areas, and vital areas. A physical protection system must achieve this by detecting unauthorized activities or conditions within these areas through detection and surveillance subsystems. Paragraph 73.45(d) permits only authorized placement and movement of strategic special nuclear material within material access areas. This must be accomplished through the use of detection and monitoring subsystems and procedures to discover and assess unauthorized placement and movement of strategic special nuclear material. Finally, § 73.46, "Fixed Site Physical Protection Systems, Subsystems, Components and Procedures," outlines typical specific safeguards measures that will often be included in an overall system that meets the general requirements of Sections 73.20 and 73.45.

Paragraph (e)(3) of § 73.46 provides for the use of closed-circuit television (CCTV) as a means of surveillance in all vaults and process areas that contain unalloyed or unencapsulated strategic special nuclear material (SSNM).

Paragraph (e)(9) of § 73.46 provides for observation of individuals within material access areas (MAAs) to ensure that SSNM is not moved to unauthorized locations or in an unauthorized manner. Paragraph (h)(7) provides for remote alarm assessment by at least two security personnel using CCTV or other means for assessing alarms occurring in unoccupied vaults and process areas. The value of the observation (visual surveillance) techniques used to meet these provisions can be enhanced by careful consideration of surveillance needs both in the design phase of plant construction and in the continuing development of operational procedures and controls.

For the purposes of this guide, visual surveillance and observation are used interchangeably to mean direct or indirect visual monitoring of an area for the purpose of detecting or assessing the activities occurring therein.

This guide describes measures the NRC staff considers acceptable for implementing the requirements of surveillance or observation within material access areas to ensure safeguarding of strategic special nuclear material.

B. DISCUSSION

1. OBJECTIVE OF VISUAL SURVEILLANCE

The objective of visual surveillance (observation) in MAAs is the detection or assessment of activities that could adversely affect the safeguarding of SSNM. This could include, among other things, the direct observation of individuals' normal work functions within MAAs and the remote monitoring of unoccupied areas, e.g., vaults or automated process areas, within MAAs. The physical protection benefits to be derived from visual surveillance include the following:

- a. The likelihood that insider considerations of theft or diversion would be reduced because of an awareness of the increased risk of detection,

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

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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.

Comments should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch.

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b. The probability that attempts at theft or diversion would be detected in a more timely manner,

c. The capability to more effectively reconstruct the events of an act of theft or diversion and thus enhance efforts to recover missing material,

d. Continuous verification of the identity of individuals within MAAs and the increased ability to determine whether nonessential activities are occurring within MAAs.

2. SCOPE OF VISUAL SURVEILLANCE

Visual surveillance of SSNM, unoccupied MAAs, areas or equipment within MAAs, or individuals in MAAs may all be of value from a safeguards standpoint.

Visual surveillance may be one of a number of alternative methods that can detect access into an area (authorized or unauthorized). When used in conjunction with other detection methods, it can also serve as a means to verify access, to assess such access, and to determine whether or not a threat exists and how severe it may be. Therefore, visual surveillance can be an effective means of either detecting or assessing personnel access.

Similarly, visual surveillance may be used to detect or assess the position or movement of SSNM itself. In certain circumstances, it may be useful as a means of verifying that only authorized activities occur during processing operations. Thus, visual surveillance can be useful in detecting or assessing the movement of SSNM both within and out of an MAA.

The use of direct observation should be planned so that there is reasonable assurance that the activities to be observed are in fact observable and that the individual acting as an observer is able to recognize and assess a potential problem as such. The use of indirect observation such as CCTV should also include consideration of what is observable, how accurately it can be interpreted, and by whom.

In some special instances, visual surveillance may not be necessary. For example, when SSNM is contained in special packages or automated processes, removal of SSNM could be detected by means other than visual surveillance and communicated to the alarm stations for initiation of response to a theft or diversion attempt.

Further, different visual surveillance methods may be appropriate to specific parts of a particular facility and for specific purposes. While direct observation may be more suitable for some areas, CCTV may be more appropriate for others. Visual surveillance may itself serve as a primary detection or assessment method or may better serve as a backup to some other primary detection or assessment component or subsystem.

3. MANAGEMENT SUPPORT

A well planned visual surveillance system requires adequate management support for optimum operation.

Without proper attention to administrative and operating procedures, theft or diversion may be difficult to detect or assess, and the possibility of recovery may be decreased.

4. SURVEILLANCE PERSONNEL

Surveillance personnel may include guards, watchmen, management personnel, or fellow workers positioned locally or remotely. To be effective, the observer must be familiar enough with the operation he or she is witnessing to be able to recognize activities that are not authorized or are not consistent with established safeguards procedures. Also for visual surveillance to be effective, a sufficient number of observers must be available to provide consistent detection and assessment capability. Consideration should be given to the changing numbers of observers who might be necessary for different situations, such as shift change, shutdown, inventory, or emergency.

Visual surveillance can be subject to certain inherent problems. The use of pairs of workers to observe each other could be susceptible to collusion. While this susceptibility can be reduced by rotating pair assignments so as not to have set pairs, any surveillance system or procedure that relies on fellow worker surveillance must recognize the reluctance of most workers to report a fellow worker. This type of system may also be of limited effectiveness when workers, in the course of their normal functioning, are located out of view of each other or must place all their attention on a competing task. In addition, a surveillance system that relies extensively on watchmen or remote viewing devices can adversely affect employee morale. A safeguards awareness program (similar to traditional safety awareness campaigns) that emphasizes the importance of visual surveillance procedures to overall employee interests can serve to counteract these disadvantages.

5. SURVEILLANCE INSTRUMENTATION

The visual surveillance function can be significantly aided by the proper use of optical or electronic devices such as mirrors, periscopes, or CCTV. Closed circuit television systems offer greater area coverage per observer and can be positioned and equipped with remotely operated controls so that large areas may be scanned or specific sections may be concentrated on. One-way viewing enclosures for the cameras may be useful in concealing the panning position and field of view of CCTV. This may be desirable so that camera scanning time and position cannot be easily anticipated by an individual attempting to circumvent the system.

The use of CCTV systems for visual surveillance that include a motion detector may also prove useful. Permanent records may be kept by the use of video tape recording. A permanent recording system could also be activated by an associated video motion detection CCTV system or separate intrusion alarm system to automatically provide a record of any action or activity occurring in the area of concern. However, the use of CCTV should not be considered a satisfactory substitute for the two-man rule.

6. PHYSICAL CHARACTERISTICS

The physical characteristics of an area can substantially affect the capability to effectively observe those activities occurring within it. Where interior partitions, equipment, material, or shielding obstruct the view, elevated viewing locations may be used.

C. REGULATORY POSITION

Visual surveillance techniques can be useful in meeting some of the performance capability statements of § 73.45. Examples of specific visual surveillance techniques for MAAs and vaults and process areas containing unalloyed and unencapsulated SSNM that are typically included in a licensee physical protection system are provided in paragraphs 73.46(e)(3), (e)(9), and (h)(7) of 10 CFR Part 73. This section describes operational measures and physical features that will aid the use of visual surveillance for the protection of strategic special nuclear material.

1. OPERATIONAL MEASURES

The following sections describe features and characteristics of visual surveillance measures acceptable to the Commission for ensuring that satisfactory observation can be maintained.

a. Administrative Controls

All facility personnel should be instructed in the objectives of the surveillance system and how it operates. Individuals, whose primary responsibility is surveillance (e.g., authorized individuals, watchmen, or guards) should be trained¹ in the use of surveillance devices and systems and should be sufficiently familiar with both routine and special plant operations to be able to recognize unauthorized activity.

A surveillance system relying on fellow worker surveillance must recognize the reluctance of most employees to report the misdeeds of fellow workers to management. When such a system is used, special attention should be given to a program aimed at instilling in each employee a sense of personal responsibility for prevention of a theft or diversion of SSNM by a fellow worker.

Surveillance policies for emergency situations should provide, if at all possible, for continued surveillance of personnel evacuating a material access area until they have been checked for concealed SSNM, for remote surveillance of the evacuated area while not compromising the surveillance of other areas that may not have been evacuated, and for temporarily assigning special surveillance activities as may be required.

¹Training requirements for guards and watchmen may be found in Appendix B, "General Criteria for Security Personnel," to 10 CFR Part 73 and NUREG-0464, "Site Security Personnel Training Manual," Volumes 1, 2, 3, and 4. Copies of NUREG-0464 may be obtained from the National Technical Information Service, Springfield, Virginia 22161.

b. Operating Procedures

The surveillance system should be tested periodically and the results of these tests documented. The range and clarity of fields of view, including the vulnerability of hardware components to interference from fluorescent lighting or sources of vibration, heat, or electric fields, should be checked. The adherence to the reporting procedures required by paragraphs 73.45(g) and 73.71(b) of 10 CFR Part 73 should be verified.

Visual surveillance procedures for the purpose of observing individuals in MAAs should provide assurances that an individual is always in the field of view of an observer. Where an independent means of monitoring the location or manner of movement of SSNM is used, the use of visual surveillance procedures should be available as an assessment tool in the event of an alarm or other indication of abnormal occurrence.

When CCTV is used to observe vaults and process areas containing unalloyed or unencapsulated SSNM, it should, as a minimum, provide a field of view that covers the total area occupied by the SSNM. The use of automatic panning cameras to provide this field of view is acceptable. In cases where SSNM is stored in multiple locations, making it impractical to provide total CCTV coverage, an acceptable alternative is a field of view that covers doors and normal approaches to material.

Visual surveillance as used to assess alarms in unoccupied vaults or process areas containing unalloyed or unencapsulated SSNM should be accomplished by two individuals using CCTV or other remote means. Where the field of view does not provide complete assurance of the nature of the alarm, direct observation of the exterior roof and walls may be necessary for adequate assessment.

Equipment, supplies, and byproducts that are used or are produced in the material access area should be kept in designated storage locations when not in use and should not be allowed to accumulate where they can interfere with surveillance.

All aisles and passageways through a material access area should be kept free of temporarily stored process materials, scrap, and trash so as not to interfere with surveillance of the area.

2. AIDS TO EFFECTIVE SURVEILLANCE

Whether direct or indirect visual observation techniques are used, the following physical features are acceptable to the Commission for ensuring a capability for effective visual surveillance.

a. Area Characteristics

An area where SSNM is processed or stored should be provided with lighting sufficient to provide adequate visual detection and assessment of the activities occurring within

the area. The actual amount of lighting necessary is dependent on the purpose of the area; its size, configuration, and reflective characteristics; and the illumination requirements of any equipment used, such as CCTV cameras.

If obstructions (e.g., room partitions, screen panels, radiation shielding, and safety barricades) interfere with direct surveillance of process aisles, process equipment, or operators; special vantage points, mirrors, or remote viewing devices should be provided.

Storage areas for in-process, feed, product, scrap, and waste materials containing SSNM should have sufficient capacity that material can be stored in designated locations in a manner that will not interfere with lighting or the field of view of surveillance devices. If storage is above floor level, the areas should be arranged with clearly defined aisles between storage racks and shelves. Each aisle that provides access to SSNM should be capable of being monitored by direct or indirect visual surveillance. If storage is below floor level (e.g., in trenches or individual pits), the area should be free of partitions, obstructions, or structures above floor level that could conceal an individual from view.

Containers of SSNM in storage should be arranged so that covers and seals are visible from adjacent aisles or passageways and from a distance of at least 5 feet.

Shipping and receiving areas should be arranged with sufficient clear space that movement of an individual around vehicles in the area can be observed. The dock area adjacent to the cargo portal of a vehicle being loaded or unloaded should be kept clear of objects that could obstruct observation of activities within 20 feet of the portal.

b. Process Equipment Characteristics

Surveillance devices, if used, should be located so that access ports (covered or in use) or bag-out stations of enclosed process lines (glove boxes or hoods) will not be obscured from view.

Where possible, detection or monitoring devices on, or associated with, process equipment, including remote surveillance devices or associated equipment, should be equipped with tamper alarms. Where CCTV with video tape recording is used, the recording function should be activated as an indication of alarm. Such use does not serve as a substitute for the use of the two-man rule to observe individuals.

Surveillance devices or stations should be located so that heating and ventilating ducts, utility piping, conduit, or other items providing services to process equipment or equipment enclosures do not block observation of work areas.

Piping, ducts, or conveyor systems used to move SSNM within a process, or from one process to another process, and to or from storage should be distinctly marked (e.g., color coded) to enhance identification of contents and function.

All SSNM containers should be designed so as to have characteristic markings to identify whether the SSNM is buffer storage, final product scrap for recycle, scrap for recovery, or waste. These containers should also be distinguishable from all other containers in the area.

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 upgraded 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.

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