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Central Alarm Station and Secondary Alarm Station Planning Document

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ABSTRACT

This report documents planning guidance for Central Alarm Stations (CAS) and Secondary Alarm Stations (SAS) as provided by the U.S. Nuclear Regulatory Commissions Upgrade Rules issued in final form in FR Vol. 44, No. 230, Wednesday, November 28, 1979. It provides basic considerations for sites licensed by the NRC to possess or process formula quantities of strategic special nuclear material relative to (CAS) and (SAS) siting, construction planning, intrusion detection systems, communications, operation considerations, miscellaneous equipment and information control.

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1. INTRODUCTION

The purpose of this report is to provide basic planning information and guidance relative to Central Alarm Stations (CAS) and Secondary Alarm Stations (SAS) which are provided in the Code of Federal Regulations CFR-10, Part 73.20,"General Performance Requirements", 73.45, "Performance Capabilities for Fixed Site Physical Protection Systems and Part 73.46, "Fixed Site Physical Protection Systems, Subsystems, Components and Procedures". Specifically, planning information is provided for CAS and SAS siting, construction and support, intrusion detection, communications, operational considerations, miscellaneous equipment and information control at sites possessing or processing formula quantities of strategic special nuclear material.

The report does not cover the specific design or selection of site intrusion detection systems, communications or security operation except as related to interfacing with the CAS or SAS.

The report is a planning guide only and all designs or modifications of CAS or SAS facilities should be accomplished by a qualified architect or engineering group or firm or specific equipment specialist as required.

References and an appendix are provided to facilitate acquisition of additional information.

The application of the planning information and selection of options should also be reviewed with the NRC prior to significant investment or adaptation since the physical characteristics and operational requirements vary from site to site.

2. SITING

2.1 SITING, GENERAL

Part 73.46(e)(5) provides for "...a continuously manned central alarm station located within the protected area and at least one other independent continuously manned on-site station not necessarily within the protected area..." Additionally, it is provided that "The central alarm station shall be located within a building so that the interior of the central alarm station is not visible from the perimeter of the protected area."

It is recommended that the CAS and SAS not be co-located within the same building. However, if it is necessary or cannot be avoided, the building and CAS and SAS should be of fire-resistive construction Type A, B or a protected non-combustible construction per National Building Codes.

If the CAS or SAS is located within an existing building, the building should be Type A or B fire-resistive construction, protected non-combustible construction as defined by National Building Code, or the building at a minimum, should have a Class A roof and a sprinkler and fire alarm system.

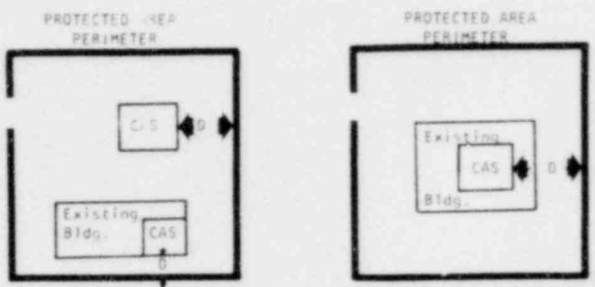
Physical separation of the CAS and SAS by a minimum of 240 feet (73 m) is a desirable planning feature. In no case should the CAS and SAS share a common wall.

2.2 CENTRAL ALARM STATION (CAS) SITING

The CAS should be located within the licensee's protected area. When designing and/or relocating the CAS, it is recommended that it be sited within the protected area perimeter by a distance of 240 feet (73 m) or more to minimize potential damage due to explosives which might be thrown into or placed within the protected area for sabotage purposes. This is equivalent to the protected distance required for up to 100 lbs. (45 kg) of Class 9 explosive to limit damage to "minor damage only". Reference Number 1. It is particularly important that either the CAS or SAS meet this criteria. See Figure Number 1 for Siting Options.

The interior of the CAS should not be visible from the protected area perimeter. This may be accomplished in several ways including:

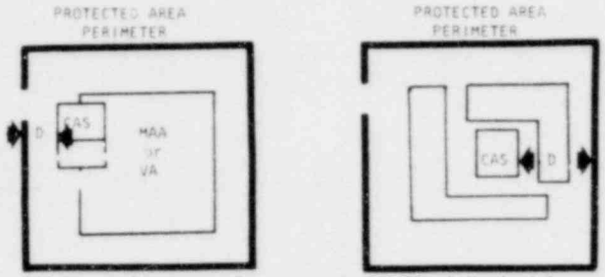
- Windowless stand-alone structure with door opening on side not visible from protected area perimeter.
- Located within an existing building perimeter such that the interior is not visible from the protected area perimeter



CAS Sited as Stand-Alone or Within Existing Building. Interior should not Be Visible From Protected Area Perimeter

CAS Sited Within Existing Building

"D" Should Be 240 ft./73 m From CAS to PA Perimeter when possible.

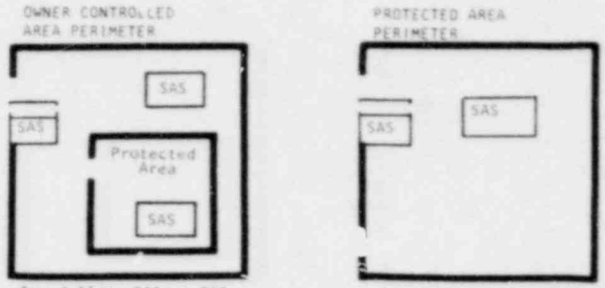


CAS Sited With Access Control Building. Interior Must Not Be Visible From PA Perimeter

CAS Sited Within A Complex of Existing Buildings

TYPICAL CAS SITING OPTIONS

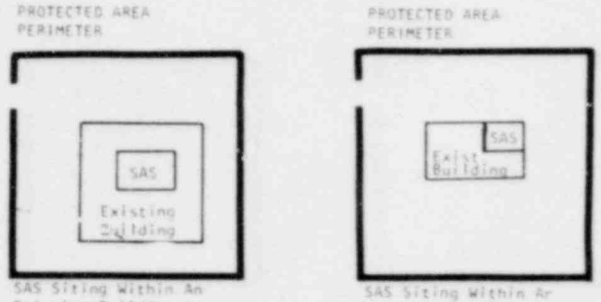
Figure



Stand-Alone SAS or SAS Integrated With Owner-Controlled Area Access Gatehouse

Stand-Alone SAS or SAS Integrated With Access Gatehouse Within Protected Area

NOTE: It is recommended that as for the CAS, the SAS should be 240 ft/73 m within the Prot[illegible]rea Perimeter when possible and that the SAS [illegible] not be visible from outside the Protected Area.



SAS Siting Within An Existing Building In The Protected Area.

SAS Siting Within An Existing Building In The Protected Area

TYPICAL SAS SITING OPTIONS

Figure 2

- Located within an area not visible from the protected area perimeter (surrounded by buildings, structures, or geologic barriers).

- "One-Way Mirrored Windows" Note: Light must be balanced such that the interior is not visible under day, night or artificial lighting conditions. See Section 3.4.

- Indirect one-way observation devices such as peepholes, periscopes, or fiber optics. See Section 3.8.2 and 3.8.3.

2.3 SECONDARY ALARM STATION (SAS) SITING

Part 73.46 provides that a second independent alarm station (Secondary Alarm Station SAS) should be provided on-site. On-site is defined as within the owner-controlled area or outside, within or contiguous to the protected area. Typical SAS siting options may be the same as those noted for CAS in Figure 1 or those noted exclusively for the SAS in Figure 2. It is recommended that the SAS interior not be visible from the protected area perimeter if possible. If the SAS is also serving as a site observation post of significant security value, it is recommended that one-way or remote observation techniques be utilized. See Section 3.4 and 3.8.

For licensee sites with two protected areas within the contiguous licensee-controlled areas, it is suggested that each protected area have a separate and independent alarm station with one serving as a CAS and the other as the SAS. If more than two protected areas are in the same contiguous licensee-controlled area one CAS and one SAS are normally sufficient. Backup power distribution, wire type telephone and communications links, duress, CCTV links and intrusion alarm data gathering wire systems should be buried underground between protected areas.

3. CONSTRUCTION PLANNING

3.1 CONSTRUCTION PLANNING, GENERAL

This section provides basic planning guidelines for the adaptation/ modification of existing facilities or construction of a new CAS or SAS facility. In some cases, typical information is provided and it is not meant to exclude other valid configurations which may meet NRC requirements. In all cases, before any significant investment is made by a licensee, it is recommended that specific site planning be accomplished with an experienced architect or engineering firm or group and that a review of the planning be provided by the NRC.

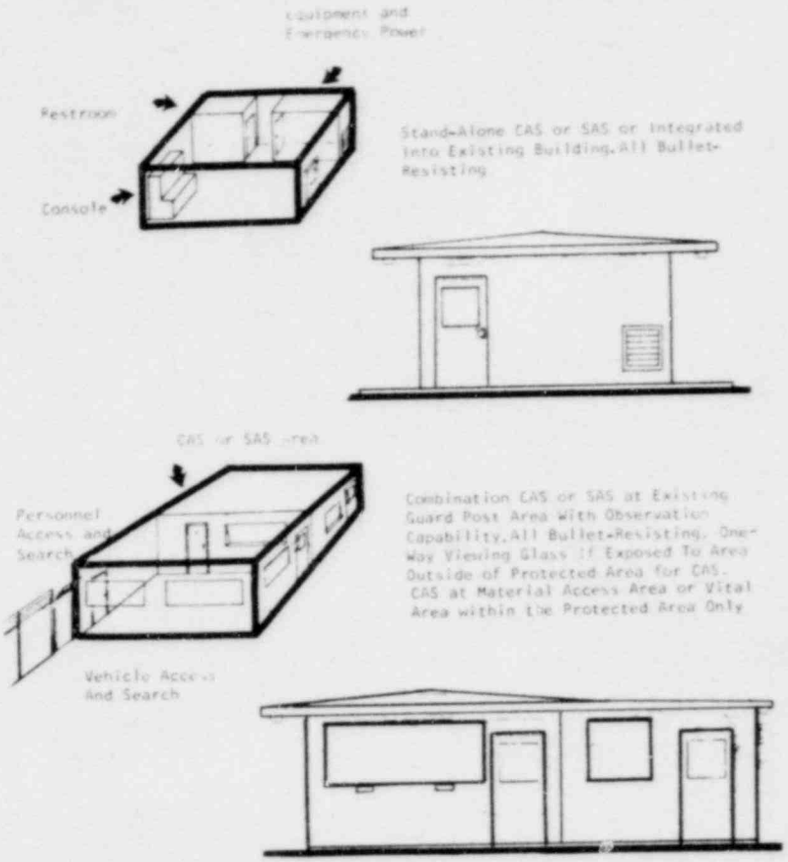
3.2 TYPICAL CONFIGURATIONS OF CAS AND SAS FACILITIES

Figures 3 and 4 provide several sketches of typical CAS and SAS configurations.

The CAS and SAS can be either a stand-alone facility or integrated into or on existing buildings. They may be windowless or have observation capabilities. Regardless of the construction configuration, siting should be in compliance with provisions noted in Section 2. They must also be bullet-resistant as noted in Section 3.3.

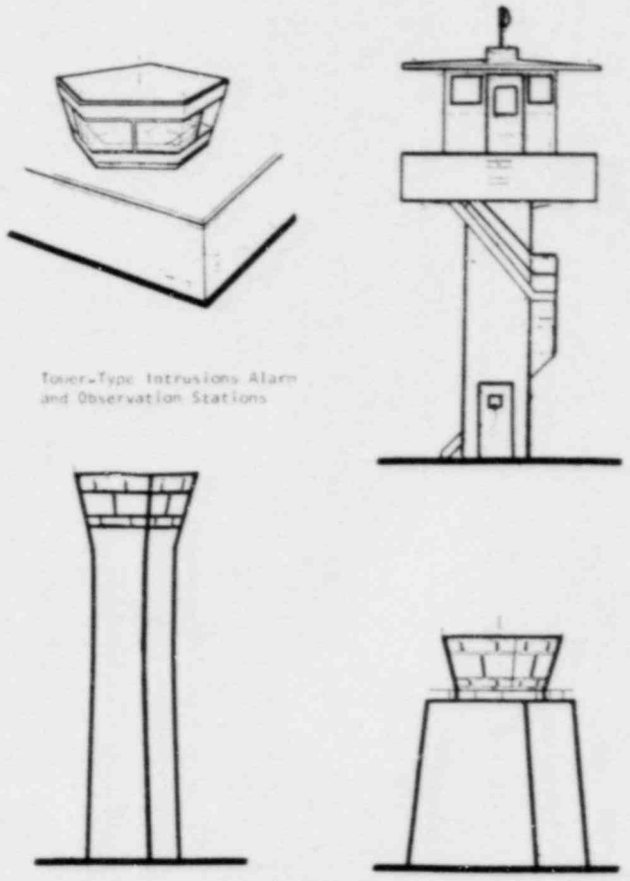
3.3 BULLET RESISTANCE

Part 73.46 (e)(5) provides that "the alarm stations shall be controlled access areas and their walls, doors, ceiling, floor and windows shall be bullet resisting". The bullet-resisting design and test criteria which is recommended is contained in the "Standard for Bullet-Resisting Equipment" UL 752, Fifth Edition, Reference Number 2. The defintion of "bullet-resisting" by UL "signifies protection against complete penetration, passage or fragments of projectiles, or spalling (fragmentation) of the protective material to the degree that no injury would be caused to a person standing directly behind the bullet-resisting barrier." It is used in conjunction with the rating of the bullet-resistant materials. The rating to be used for CAS and SAS is (High Power Rifle (HPR): .30-06 rifle; 24 inch barrel; 220 grain soft point ammunition; 2,410 fps muzzle velocity; 2830 ft-lb muzzle energy). Materials, or equipment procured for bullet-resisting purposes should be clearly marked with its UL rating. Figure 5 shows a typical marking. Criteria for performance testing bullet-resisting materials is included in the Appendix as taken from the December 8, 1976, update of UL 752. If the material utilized by the licensee is not UL listed, it will be necessary for the licensee to provide to the NRC documented evidence that the material used will meet the UL specification or certified test results. Note that Appendix B is provided for information and all of the materials do not meet the UL HPR rating level. Also many vendors are



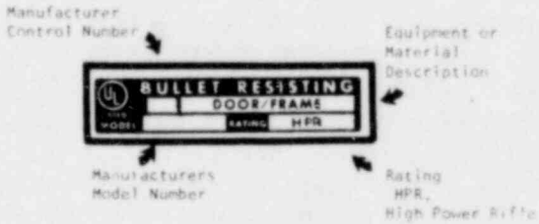
TYPICAL CAS AND SAS CONFIGURATIONS

Figure 3



TYPICAL CAS AND SAS CONFIGURATIONS

Figure 4



UL MARKING FOR BULLET-RESISTIVE MATERIAL

Figure

noted who do not necessarily provide UL listed materials to the HPR rated level or do not use the UL test criteria.

High-hardness armor steel is produced by several firms to Mil Specifications in thicknesses of 3/16 in. to 3/8 in. Standard armor steel is manufactured to Mil Specification MIL-A-12560. MIL-S-46100 is approximately 20-30% more effective than MIL-A-12560. (Reference Number 3). Dual hardness steel "Ausform Dual Property Steel Armour (DPSA)" is the lightest weight metallic armor available for defense against small caliber ball projectiles (Reference Number 3 and 12). Another DPSA is DHA-3 or DHA-2.

Ceramic armor is most effective when bonded to an aluminum or a glass reinforced plastic laminate. In this case the outer ceramic layer shatters the projectile and the inner layer catches the pieces. (Reference Number 3, 4, and 12). Its weight is quite a bit less than a dual hardness steel. For applications where weight is a key consideration ceramics may be effective as cost/weight trade-off, otherwise they are relatively expensive for "building" materials.

Most resin-filled fiberous glass and other laminates such as DuPont's Kevlar 29 or 49 are not designed to resist high power rifle projectiles. Contacts with DuPont representatives indicate that Kevlar is not specifically designed for high power rifle bullets (Reference Number 6). Most testing for glass and Kevlar laminates is done for light weight body armor designed for protection from fragments and other lower energy projectiles. (Reference Number 7 and 8). Kevlar 29 and 49 and woven glass also provide an effective backing for ceramic armor systems, such as B_4C. In these systems, the ceramic armor breaks up the projectile which is then caught by the glass or Kevlar. (Reference Number 9). With this in mind, it is possible that a fiberglass or Kevlar liner inside a concrete block building could provide adequate bullet resistance for walls. However, no test information is available. This liner could be in the form of a resin-filled laminate fastened to the wall or draped fabric, or attached with battens or located between the concrete wall and interior sheet rock or interior finished panel.

Bullet-resistant concrete walls, roofs, or floors can be provided with a minimum of 6-inch thick reinforced concrete. Floors can be poured on ground and raised to the proper position or poured in place over temporary forms. Walls and roofs can be poured in place or on the ground and raised to their final position. Walls should be reinforced with #4 rebars on 18-inch centers. Roof and floor reinforcing will depend on installation loads, span, etc. Typically, walls will utilize 3,000 PSI concrete and prestressed roofs, floors or walls (if a high rise observation post/tower is contemplated) will utilize 6,000 PSI concrete subject to specific design. Reference Number 10.

Other concrete, including cellular and fiber-reinforced cellular, have been tested (Reference Number 11). These materials were tested in configurations 6 inches thick of foamed concrete, both with and without

.9 lbs/cubic foot of glass fibers. Air made up .45 cubic feet/c bic foot of the concrete. Penetration of 7.62 mm projectiles was limited to 1 1/2 to 3 inches. This material merits further consideration in areas where weight is a limiting factor.

The standard transparent bullet-resisting material for a HPR rating is laminated glass. UL rated glass is available. Two inch thick glass should not be confused with two inch thick acrylic, polycarbonate or other plastic type material.

Many bullet-resisting materials are available off-the-shelf, can be fabricated to specification, built in place, added to existing facilities or complete prefab bullet-resisting alarm/guard stations can be procured. The following paragraphs describe some of the options. Military armor specifications, as a matter of interest, are included in Appendix D.

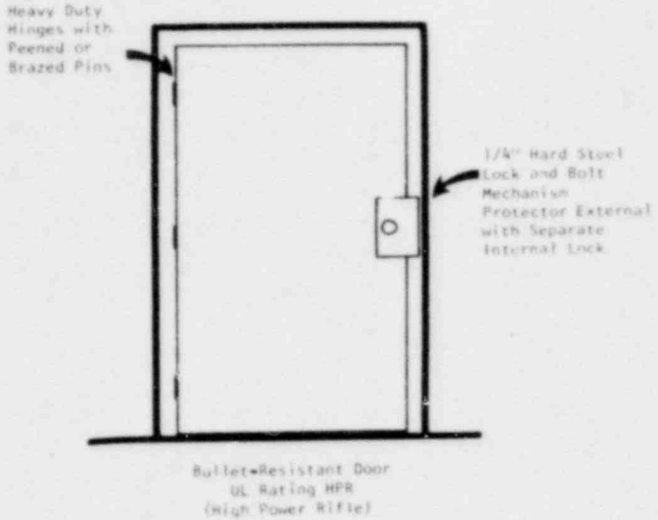
3.3.1 Doors

Bullet-resisting doors, frames, and hardware are typically steel-skinned with hardened steel, ceramic composites or reinforced laminate armor. Appendix I, Table I provides the identification of manufacturers of prefabricated doors. See Figure 6.

3.3.2 Walls, Ceilings and Floors

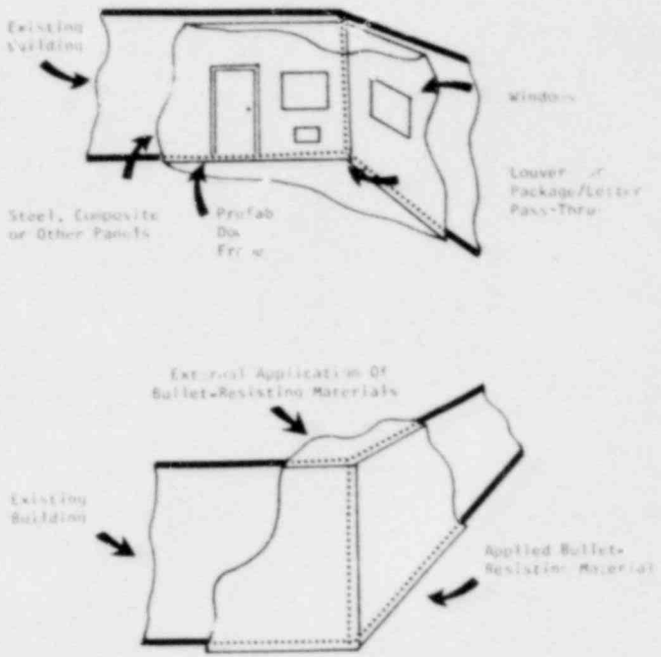
A partial list of suppliers is noted in Appendix B. Corners, doors, frames and other hardware should be continuously bullet-resisting. Cracks or weak spots which do not meet the UL standard should be avoided. Vision panels, "pass-thrus", gunports, etc. should be of the same bullet-resisting specification.

Materials for walls, ceilings, and floors may be high strength steel, reinforced laminate armor, ceramic composites, reinforced concrete or other materials. They may be applied in existing buildings or integrated during construction of the CAS or SAS. In both cases an architect should be involved in review and specification to assure proper ceiling, wall and floor structural integrity. Prefab bullet-resisting structures are also available. If floors are slab-on-grade, no bullet resistance treatment is required. See Figure 7. Trenches or a raised floor (computer room type) may be useful if extensive cables and junctions are required. Reference Appendix B, Table II.



CAS AND SAS DOOR CONCEPTS

Figure 6



APPLICATION OF BULLET-RESISTING MATERIALS TO EXISTING FACILITIES

Figure 7

3.3.3 Windows

Materials for transparent armor are typically glass, plastic or a laminated combination. Prefab windows made up as "teller windows" are available as well as window material made to specification. In most cases the supplier will have to cut the transparent armor to size prior to delivery as many difficulties can be encountered in cutting. See Section 3.3.7. Reference Appendix B, Table III.

3.3.4 Pass-Thrus

Bullet resistant pass-thrus are available and utilized by the banking industry for example. They provide bullet resisitant capabilities of transfering documents or packages through a protected device without having to provide access to the CAS or SAS. Many of these devices are manufactured and made ready for installation. Reference Figure 8. Reference Appendix B, Table IV.

3.3.5 Louvers

Louvers can be procured which meet physical and bullet resisting requirements. Louvers would be typically utilized for air conditioning, return air, etc. Reference Miscellaneous Openings Section 3.9 and Appendix B, Table V. See Figure 9.

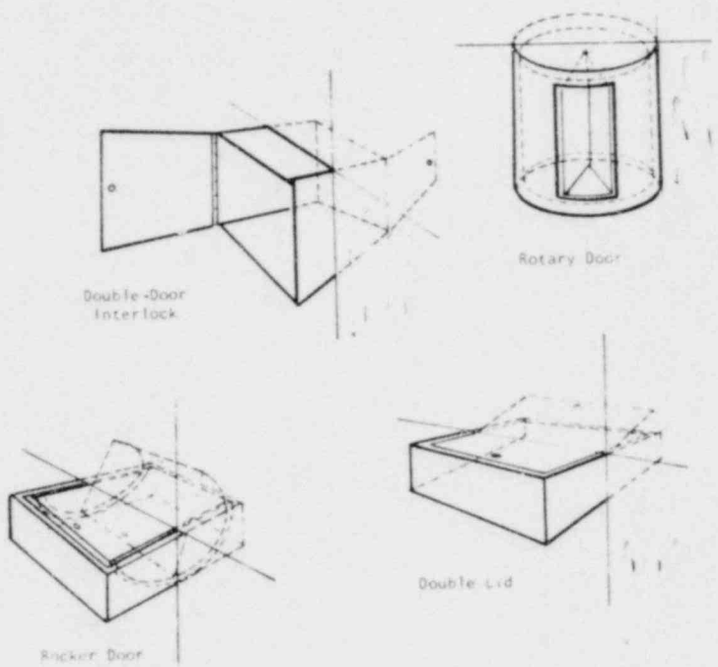
3.3.6 Gunports

The CAS or SAS is not to be used as an offensive response facility. For defensive purposes gunports may be desirable. Bullet-resisting gunports would be required if gunports are utilized. Also reference Appendix B, Table VI.

3.3.7 Bullet-Resisting Materials and Equipment Installation

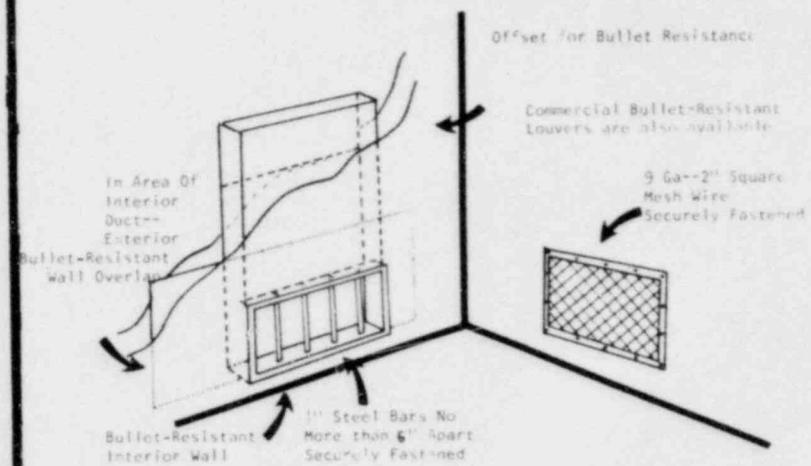
As noted, many bullet-resisting materials and fixtures can be procured raw, as a subassembly (a teller window, pass-thru, door, etc.) or a complete prefabricated building. When possible, finished component utilization may be the best method of acquiring bullet-resistant capability since it eliminates cracking, annealing and other problems which might be involved in custom installations and on-site fabrication

In all cases strict adherence to the manufacturer's installation, use and maintenance requirements should be followed. Guidance of an experienced architect and/or engineering firm is recommended.



TYPICAL DOCUMENT AND PACKAGE PASS-THRUS

Figure 8



NOTE: The above should be used openings of one square foot or more (the smallest dimension greater than 6 inches.

PHYSICAL PROTECTION SCELLANEOUS OPENINGS

igure 9

Many glasses and steels require cutting, fabrication and/or assembly prior to final processing or heat treating. Therefore in some cases drilling, cutting and/or welding can diminish the strength of the materials or cause failure if accomplished after factory processing.

Plastic transparent armor installation should take into consideration the exposure of the surface to chemicals and abrasion. Cutting, edge polishing, and forming of all transparent armor should be done to manufacturer's specifications. The use of counter-sunk screws, self-tapping screws, slots, and notches are discouraged as they can cause stresses and weaknesses in transparent armor.

Windows of transparent bullet-resistant material and one-way glass should be installed in accordance with the manufacturer's specification and hardware which has been appropriately UL approved. Windows should offer substantial intrusion resistance as well as bullet resistance. If, for some reason, it is not possible to provide a substantial mounting for the bullet-resistant window, then they should be fitted with solid one-half inch bars (separated by no more than six inches), plus cross bars to prevent spreading, or wire mesh securely fastened on the inside.

If the CAS or SAS serves as an observation post, the windows should be installed at an angle of approximately 15° with the top leaning out if a tower or second floor is used or leaning in or out if at ground level. This will minimize reflections from within the CAS or SAS and interferance with observation requirements. Consideration should also be given to designing the window such that the external layer is of glass to minimize maintenance and possibility of scouring from fire or chemical application. One-way glass should be installed on the inside of the bullet-resisting glazing.

3.4 VISUAL ISOLATION OF WINDOWS

Part 73.46 (e)(5) provides that "the central alarm station shall be located within a building so that the interior of the central alarm station is not visible from the perimeter of the protected area." If it is necessary for the CAS or SAS operations to have direct visual observation through windows, and as a result this makes the interior of the CAS or SAS visible from outside of the protected areas, "one-way" mirrors may be utilized to prevent observation of the interior. Large panes of one-way mirrored glass are commercially available in clear, gray or bronze. They are known by various trade names such as "Duovue", "Mirror Pane" or "TransView" for example. Thicknesses available range from 1/8 inch to 3/4 inch. Light transmitted through the glass is approximately 8% for clear and 4.5% for gray or bronze. Other reflective glass not specifically designed for one-way viewing

could possibly be utilized and has 7 to 30% transmittance. One-way glass requires a higher light level on the unsecured side than on the secured or observer side. Typically for the clear one-way glass this ratio is 8:1 to 10:1. For bronze or gray glass, it is typically 4:1 Reference Lighting Section 3.5. Note that windows also should be bullet-resisting as recommended in Section 3.3.3.

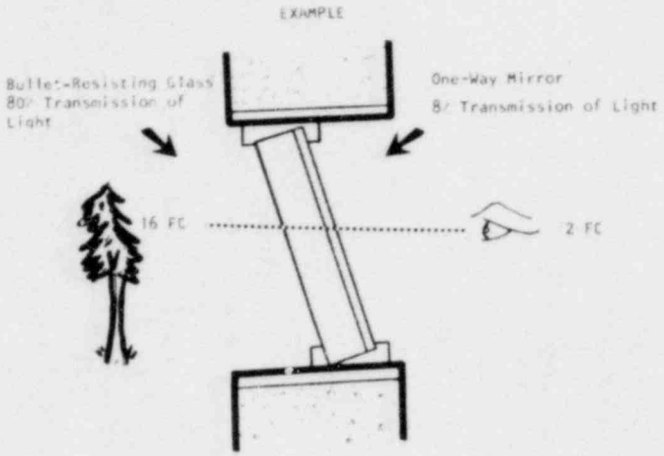
As noted in Section 3.3.7, observation windows of a relatively large size should be installed at an angle to minimize internal reflection problems which are particularly troublesome at night or during periods of low external light levels. The use of both transparent, bullet-resisting material and one-way viewing mirrors will further compound this problem. If it is intended to view the protected area or protected area perimeter which at night, may have only .2 footcandles of light available, it may be found to be impractical to use this combination since the interior of the CAS or SAS would only be "seeing" an equivalent of .01 to .025 footcandle through the window. See Figures 10 and 11. This will require near darkness in the CAS or SAS. Experimentation at the specific site is suggested prior to major commitments. External lights in the close proximity of the exterior window could be directed to "wash" the window without shining into the CAS or SAS.

At the door to the CAS, if one-way mirrors and bullet-resisting transparent armor are utilized, the exterior light in the door area should be bright enough to preclude viewing from the protected area perimeter.

3.5 LIGHTING

3.5.1 Interior Lighting

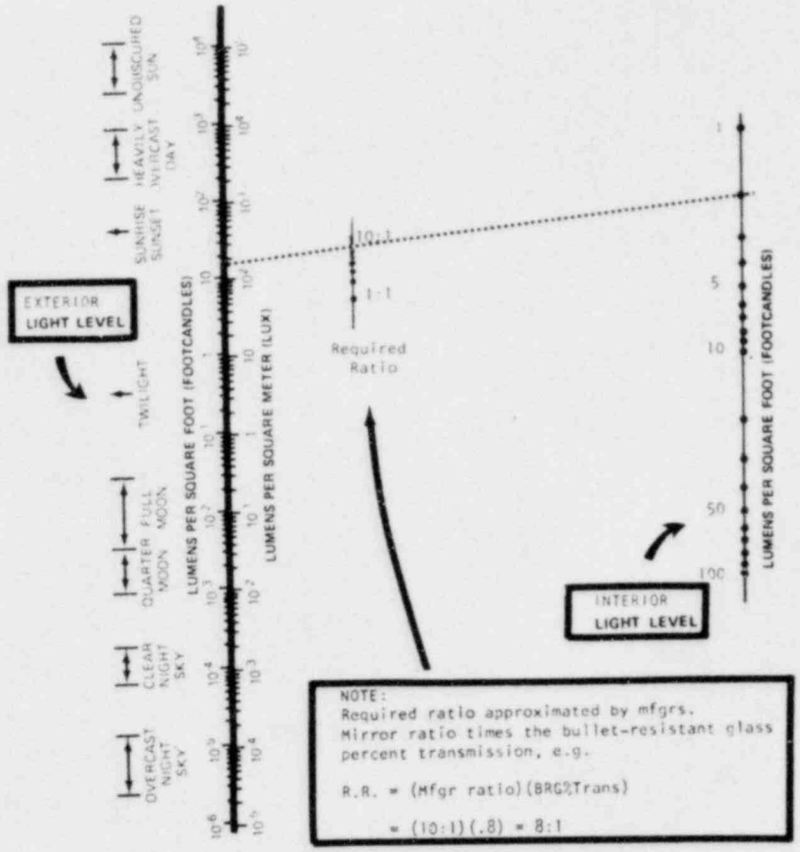
Reference Section 3.4 if one-way viewing mirrors are to be utilized. Since most CAS's and SAS's will contain closed circuit television (CCTV) monitors as well as intrusion alarm console lights, consideration must be given to lighting levels which will not degrade significantly the ability to view these devices. The overall lighting should be kept low with a separate circuit for high level lighting for maintenance or other purposes. It is possible to provide high intensity local lighting for reading, etc. with desk/drafting-type lamps where required, therefore avoiding high intensity room wide. It is important not to have light placements which cause reflections on the CCTV screens. High level lighting for maintenance purposes can range from 50 to 100 footcandles. For security operation purposes, it is recommended that a variable lighting level (rheostat-contolled) be installed on a separate circuit. Since the CAS and SAS design, console design, CCTV monitor designs and sizes are quite variable, the variable lighting level will allow the operator to adjust to a comfortable level. To assure reasonable contrast on CCTV monitors, the room light level may be as low as 1 footcandle. The suggested level is from 1 to 10 footcandles at the



If There Are FC's Outside	Inside There Will Be FC's
16	2
.2	.025
800	100

ONE-WAY VIEWING MIRROR LIGHT RATIOS

Figure 10



APPROXIMATE EXTERIOR/INTERIOR LIGHT RATIOS FOR ONE-WAY MIRRORS

Figure 11

CCTV console. Reference air traffic control room lighting levels, Reference Number 13. Variable intensity lights work best if of an incandescent type since fluorescents tend to flicker at low levels and should be installed in a recessed ceiling fixture or other area which will provide indirect light for the CAS or SAS interior. Low cost, wall-mounted emergency light (continuous charge) are also recommended. If the CAS or SAS is utilized as a windowed observation post, ceiling lights should be recessed and/or have a parabolic type lens which provide vertical light only.

3.5.2 Exterior Lighting

If the CAS or SAS is in the proximity of an access control gate or perimeter fence, the lighting levels will be from .2 footcandle to 2 footcandles. If the CAS or SAS is a stand-alone building, it is recommended that the exterior lighting should be designed for a 2 footcandle level to provide illumination for security patrol purposes. These lights should be installed such that they do not shine in the eye of approaching vehicle drivers, etc. causing a hazardous situation. Whether the CAS or SAS is within a building or stand-alone, it is important to have lighting at the access door which is adequate for personnel identification prior to entry. This lighting level should be 30 footcandles minimum and/or the level required for the selected remote identification system (CCTV, fiber optics, peepholes, etc.)

3.5.3 Interior/Exterior Lighting

Consideration for external and internal lighting ratios will depend on whether or not one-way mirrors are utilized. Reference Section 3.4.

3.6 PHYSICAL SECURITY OF DOORS

The recommended physical security level for doors and hardware is noted in UL 1034 Reference Number 14. This level is designated as a relatively high level of physical security. Other applicable standards include UL 437, "Key Locks" (Reference Number 15); UL 768, "Combination Locks" (Reference Number 16); DOD 5200, "Industrial Security Manual for Safeguarding Classified Information" (Reference Number 17); Regulatory Guide 5.12, "General Use of Locks in the Protection and Control of Facilities and Special Nuclear Materials", 1973, (Reference Number 18) and Federal Specification FF-P-110F, "Padlock, Changeable Combination (Resistant to Opening by Manipulation and Surreptitious Attack)" (Reference Number 19).

A summary of planning guides follows:

- The locks, lock bolt, door bolt operating cam, and bolt operating linkage connected thereto should be protected by a tempered steel alloy hardplate located in front of the parts to be protected. The hardplate should be at least 1/4 inches in thickness and be in the Rockwell hardness range of C-63 to C-65. It should cover an area such that tampering with the bolt is precluded without removal of the plate.

- Door assemblies and components should incorporate no screw, bolt, pin, or other mechanical factor which is accessable from the outside and whose removal would permit entry by disassembly. Hardware accessible from outside the area should be peened, brazed, or spot welded to preclude removal.

- Heavy-duty builders' hardware should be used in construction and all screws, nuts, bolts, hasps, clamps, bars, hinges, pins, etc., should be securely fastened to preclude surreptitious removal and assure visual evidence of tampering.

- In addition to the lock accessible from the exterior of the CAS and SAS, doors should be secured from the inside with a panic bolt, a dead bolt, or a rigid wood or metal bar (which should preclude "springing") extending across the width of the door and held in position by solid metal clamps. This should be constructed of heavy duty hardware consistent with the class of security noted above. When this is used, an alternate route of emergency entry or method of forceful entry should be provided in case the operator becomes ill or incapacitated.

3.7 ENVIRONMENTAL CONSIDERATIONS

3.7.1 HVAC

Heating, ventilation and air conditioning (HVAC) is an important aspect of the CAS and SAS planning. It is recommended that air conditioning and heating be sized to provide a comfort range of 68° to 72° F. Due to the general monotony of the CAS and SAS job assignment and the need to maintain alertness at a level greater than many other assignments, the area should not be subjected to "economy" temperature measures.

Ducting into and out of the CAS and SAS should be intrusion resistant as noted in Section 3.9. Additionally it is recommended that a switch within the CAS and SAS be available to the operator to allow shut-down of the air circulation system and that ducts be designed to facilitate closing by the operator to prevent the introduction of smoke or irritants if required. An alternate, concealed source of fresh air may be considered.

Air conditioning and air handling equipment should consider the heat load generated by the alarm station and communication console, battery charging equipment, etc. Ventilation consideration for gas generated by battery chargers should be considered. See Section 3.11.

If equipment is temperature or humidity (static electricity) sensitive (as many computers and solid state devices are), it is necessary to assure emergency power and air conditioning to provide 8 hours of emergency back up environmental control. All equipment within the CAS and SAS should have manufacturer's specifications reviewed for temperature and humidity tolerance levels.

3.7.2 Noise

If alarm console and equipment (such as ventilating fans, computer disc operations, computer printer operations, etc.)are noisy, consideration should be given to interior accoustic treatment on the ceiling and/or walls or a separate room for noise generating equipment. Emergency generators will require significant accoustic and vibration isolation. Transformers, solid-state power supplies and battery chargers can also cause significant and distracting noise and should be soft-mounted with consideration for accoustic isolation.

3.7.3 General Finish

General interior equipment, walls, ceiling etc. should have a non-reflective surface to avoid distractions. If the CAS or SAS is utilized as an observation post (with angled windows) the ceiling and fixtures as well as the walls should be painted a dark flat color to minimize internal reflections during both daytime and night time observation.

3.8 OBSERVATION CAPABILITIES

3.8.1 Observation Capabilities, General

If properly protected (i.e. bullet resistant), the utilization of a CAS or SAS as an observation post is not inconsistent with its operational purpose. However this is only true if all intrusion detection devices provide an audible alarm (including CCTV devices) when violated, upon failure, or when tampering occurs.

3.8.2 Remote Observation Concepts, Access

Remote observation capabilities from the CAS and SAS can be accomplished by CCTV, peepholes, bullet-resistant glass, fiber optic devices, or periscopes. The remote observation method should not degrade the bullet resistance of the CAS or SAS. Figure 12 provides typical configurations which may be utilized.

Planning guidance for CCTV systems is provided in NUREG 0178, "Basic Consideration for Assembling a Closed Circuit Television System", Reference Number 20 and "Intrusion Detection Systems Handbook Volume II", Reference Number 21. Specific guides for CCTV systems which monitor material access areas and vaults are covered in Section 4.8. CCTV may be installed to provide access verification prior to entry into the CAS or SAS. For this purpose lenses are available which will provide an image of the individual as well as a close-up of the individual's badge at the same time.

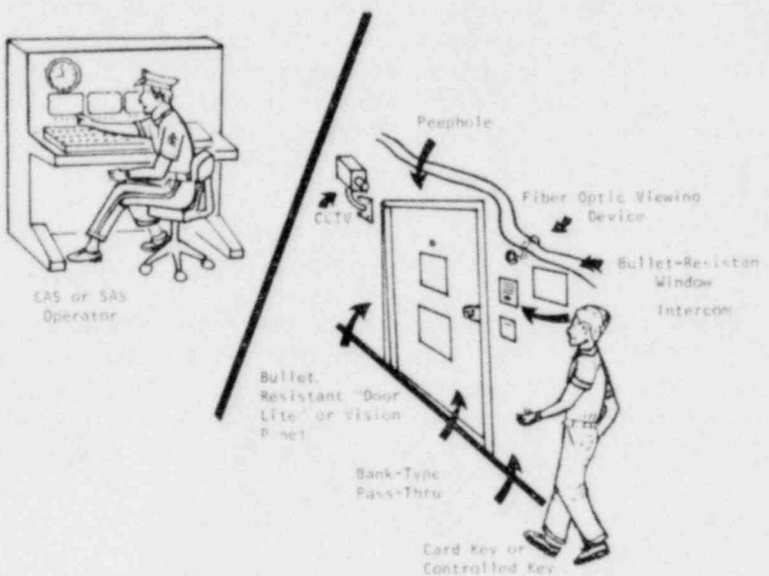
Bullet resistant one-way viewing mirrors are covered in Sections 3.3, 3.4 and 3.5.

Fiber optic devices provide an indirect viewing device which does not have to go straight through the wall or door but can be offset to provide bullet resistance. Conduits can be installed in places which form a "S" near the door. They can remain plugged except during use when a flexible fiber optic viewing device can be inserted. Fiber optic devices could also be installed permanently. Reference Figure 12.

3.8.3 Observation Concepts, Area

Several methods for observation from the CAS or SAS, in addition to bullet-resistant glazing, are available as noted in Section 3.8.3. Zoom, pan and tilt CCTV cameras may be utilized if additional area coverage is required as shown in Figure 13.

Fiber optic viewing systems can be installed in the wall or door which provide an indirect line-of-sight. This may assist in minimizing problems with bullet-resistant observation capability.



CAS AND SAS ACCESS AUTHORIZATION IDENTIFICATION OPTIONS

Figure 12

Periscopes may be fabricated utilizing prisms or mirrors as shown in Figure 13 or procured (such as military surplus or hunting spotting scopes). Installation should provide an indirect line-of-sight which is inherently bullet-resistant.

Standard hardware peepholes may be installed in either the door or wall. Also bullet-resistant "lites" or windows may be installed in doors or walls. See Sections 3.3, 3.4 and 3.5.

3.9 MISCELLANEOUS OPENINGS

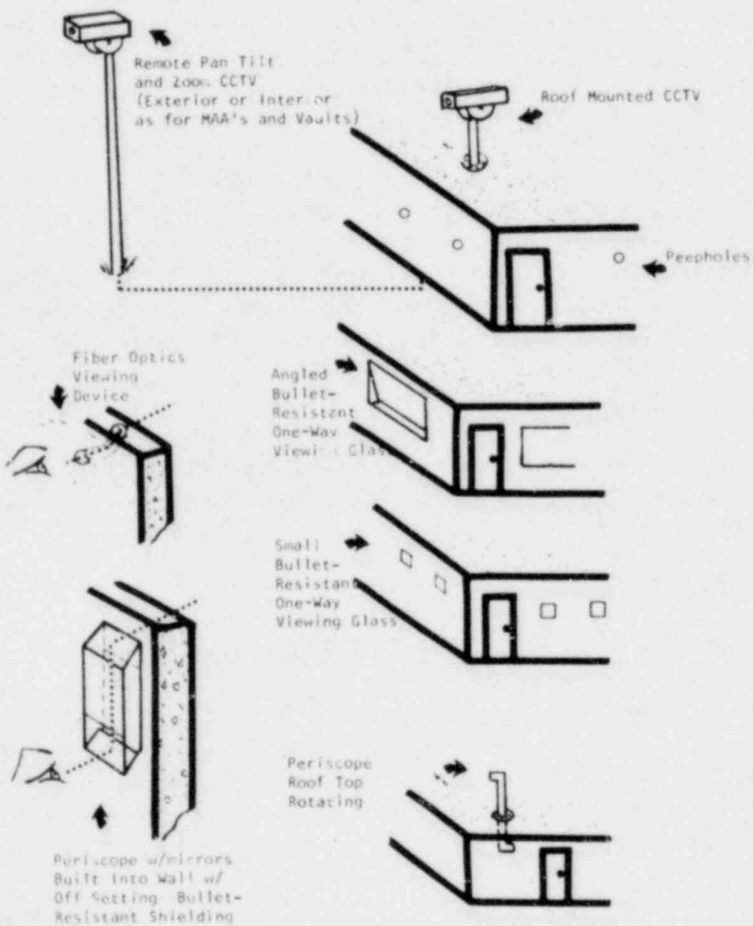
Where ducts, registers, sewers and tunnels are of such size and shape as to permit unauthorized entry, (areas greater than 1 square foot unless one dimension is less than 6 inches) they should be equipped with man-safe barriers such as wire mesh (No. 9 gauge, 2-inch square mesh-Fed. Spec. RR-F-191d, Reference Number 22) or solid steel bars of at least 1/2 inch in diameter extending across their width with a maximum space of 6 inches between the bars. The steel bars should be securely fastened at both ends to preclude removal, with cross bars on 6-inch centers to prevent spreading. Where wire mesh or steel bars are used, care should be exercised to insure that equipment and material within the room cannot be removed or tampered with the aid of any type of instrument. Reference Figure 9.

Bullet-resistance should be continuous in the areas of ducts and openings. Figure 9 shows an overlapping bullet-resistant material to accomplish this. Bullet-resisting and access-resisting louvers are commercially available. Reference Appendix B, Table V.

3.10 PLUMBING

Plumbing will typically be required if a restroom is included within the CAS or SAS. If restrooms are available, the relief and/or operator rotation period may be extended. Additionally the availability of a restroom within the CAS or SAS secured area could provide for an extended siege or continuous emergency coverage. If a restroom is not provided, an emergency "camp-type" portable toilet is recommended for availability.

Additionally, plumbing is required for fire protection purposes in accordance with standard fire protection codes. U.S. Nuclear Regulatory Commission Regulatory Guide 1.120 (for comment), "Fire Protection Guidelines for Nuclear Power Plants", June 1976, (Reference Number 23) and "General Fire Protection Guide for Fuel Reprocessing Plants",



REMOTE EXTERNAL OBSERVATION CONCEPTS

Figure 13

NUREG Guide 3.38 (for comment), Reference Number 24, provide basic guidelines and planning criteria. Adequate drainage for fire protection water should be provided to assure that emergency exit can be accomplished without jamming doors, etc.

A water cooler within the CAS or SAS will require plumbing for water and drainage if tied in with the site water system. If a water bottle type is used, only drainage will be required. Since a water bottle type provides an independent supply of water for emergency use, it is recommended. As an alternative, plastic bottles (1 gallon) can be stored within the CAS or SAS for emergency use.

3.11 EMERGENCY POWER

Provisions cited in Part 73.46 (e)(6) state that "All alarms required by this section shall remain operable from independent power sources in the event of the loss of normal power. . .Switch-over to standby power shall be automatic and shall not cause false alarms on annunciation modules." The CAS and SAS can share a common emergency power system or they can have independent emergency power systems. The emergency power systems should provide power for CAS and SAS lighting, HVAC, alarm and communication subsystems for a minimum of 8 hours of continuous operation.

This may require a parallel power source which can be either a separate independent generator power source, uninterruptable power supply (UPS), a constantly charged battery source or a constantly charged battery source with automatic or manual starting generators. Starting capability should be considered for location within the CAS or SAS.

It may be desirable to have the radio/microwave communication system operate from separate emergency batteries within the CAS or SAS as well as internal lights (wall-mounted emergency lights).

The intrusion alarm system should normally run on commercially supplied AC power. Should this supply fail, an alarm indicating that it has done so should annunciate in the CAS and SAS both visually and audibly.

Note that power supply planning should include air conditioning required to keep communications and alarm equipment within operational temperature and humidity tolerances.

It is recommended that physical security protection (controlled access area) be provided for the emergency electrical power system and that power cables/lines into the CAS and SAS be underground to minimize tampering possibilities. If it is necessary to have emergency power routed between protected areas, this should be installed underground as well.

Outdoor generators and fuel supplies can be protected with a barrier of sandbags or a reinforced concrete wall (6 inches).

Other criteria for installation is included in:

- Regulatory Guide 1.108 "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants", August, 1977.
- Regulatory Guide 1.6, "Independence Between Redundant Standby (On Site) Power Sources and Between Their Distribution Systems (Safety Guide 6)", March, 1971.
- Regulatory Guide 1.9, "Selection, Design and Qualification of Diesel-Generated Units Used as Onsite Electric Power Systems at Nuclear Power Plants", November, 1978.
- Regulatory Guide 1.81, "Shared Emergency and Shutdown Electric Systems for Multi-Unit Power Plants."
- Regulatory Guide 1.93 "Availability of Electric Power Sources," December 1974.
- Regulatory Guide 1.118 "Periodic Testing of Electric Power and Protection Systems." June 1976.
- Regulatory Guide 1.128 "Installation, Design and Installation of Large Lead Storage Batteries for Nuclear Power Plants" (for comment) April 1977.
- Regulatory Guide 1.129 "Maintenance, Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978.
- Regulatory Guide 1.137 "Fuel-Oil Systems for Standby Diesel Generators" (for comment) January 1978.
- Regulatory Guide 5.44 "Perimeter Intrusions Alarm Systems", June 1976.
- NUREG 0320 "Interior Intrusion Alarm Systems" February 1978.
- NUREG/CR 0509, "Emergency Power Supplier for Physical Security Systems" (1979).

Backup and emergency power systems should be maintained in accordance with the manufacturer's specifications. Preventive maintenance and inspections should be scheduled accordingly, accomplished, documented and verified.

Power generators (diesel, gas or other) should be performance tested in accordance with references noted above. Operational tests (starting) the unit and operating it for a time adequate to bring it to operating power and temperature) should be accomplished weekly with or without load and monthly with load. It should be accomplished more frequently if recommended by the manufacturer. The security staff supervisor should confirm operation of all intrusion alarm, communication, security lighting, etc. during the test and subsequent to the test. These tests should be logged and records kept for two years. Vibration and accoustic isolation should be provided for generators.

Battery systems should be maintained in accordance with the manufacturer's specifications. Preventive maintenance and inspections should be scheduled accordingly, accomplished, documented and verified. Periodic testing should be accomplished as noted for generators (i.e. notification of security; operational test by security; post test of security equipment; and logging of the test).

3.12 FIRE PROTECTION, ELECTRICAL AND OTHER CODES

All construction and/or modification design, equipment selection, construction and operation shall be in accordance with appropriate standards and codes and/or special requirements noted in this planning document or elsewhere. This document is not intended to provide standard construction details or codes.

Particular attention should be given to lightning protection for the intrusion detection and alarm systems and console, emergency power systems and communications systems (antennas, etc.).

Fire protection design should conform to Fire Resistive Construction Type A, B or Protected Non-Combustible Construction as defined by National Building Codes.

Switchboards and consoles should be provided with water sheds permanently installed over the equipment if it is subject to flooding from fire sprinklers. Other systems, such as Halon, may be utilized.

Two portable fire extinguishers with a total of 20 B:C rating and one 2A should be located in the CAS and SAS.

The CAS and SAS should also be tornado and earthquake resistant.

3.13 DEFENSE CAPABILITIES

It is not intended that the CAS or SAS operator be a part of the response force. Additionally, bullet-resisting CAS or SAS facilities with physical hardening and other options recommended in this document provide significant operator defense capabilities. Although the CAS or SAS operator is not a part of the response force, it is recommended that side arms be provided and that the operator be qualified in their use for defensive purposes.

The use of gunports is optional and they should be utilized only for the defense of the CAS or SAS and not the site as a whole. Gunports can be used for defensive firing to keep adversaries away from the CAS or SAS or they can be used to eject irritant emitting canisters. It is a common practice at some prisons to have this capability at sally ports. Note that the use of such devices is subject to various federal, state and local laws. The gunport should meet bullet-resistance requirements as noted in Section 3.3.6.

Other defensive strategies could include a piping system around the perimeter of the CAS or SAS to dispense irritants, intense external sound or electric shock devices which could be activated when required (Reference Number 25).

Although none of the above unusual methods are required, they are available for consideration. Other than the gunports, detailed information on the above will require licensee research and investigation.

4. INTRUSION DETECTION

4.1 INTRUSION DETECTION, GENERAL

Provisions in 10 CFR Part 73.46,"Fixed Site Physical Protection Systems, Subsystems, Components and Procedures", Section (e), describes the intrusion detection provisions for nuclear fixed site facilities. Reference Numbers 20, 21, 26, 27 and 28 provide general guidance on exterior and interior alarm systems.

It is not the purpose of this document to define the various alarm systems except to the extent noted below:

- All intrusion alarms required should terminate at both the CAS and SAS.
- They should annunciate visually and audibly upon activation by an intruder.
- They should have an independent power supply capable of 8 hours of continuous operation.
- The independent power supply should not cause false alarms upon activation.
- The status of all alarm systems should be displayed at all times.
- Activation of the independent power supply should cause both a visual and audible alarm in both the CAS and SAS.
- All alarm systems should be tamper-indicating and self-checking or have self-checking capability.
- All indicators of tampering or failure should be annunciated at both the CAS and SAS both visually and audibly.
- All alarm annunciations should indicate the location of the alarm (by zone, building, door, room, etc.)
- Duress alarms should annunciate visually and audibly at both the CAS and SAS. Exceptions: If roving patrols utilize portable radios as a duress communication device, a visual alarm is not essential.

- All alarm systems should be repaired and maintained by two individuals working as a team. The security shift supervisor should be notified before maintenance begins and upon completion and should conduct operational verification tests.

- All alarm systems should be tested at the beginning and end of each use period, not to exceed 7 days.

4.2 INTRUSION ALARM REDUNDANCY

All intrusion alarms required should terminate at both the CAS and SAS so that a single act cannot remove the capability of monitoring, controlling, calling for assistance or responding to an alarm. Redundancy is defined to mean that both the CAS and SAS independently receive and annunicate the same alarm signal and monitor and control each alarm signal source/zone in the alarm reporting system. This requires that, at some point before the alarm signal reaches the CAS or SAS, it must be split or divided such that each receives an independent signal, which cannot be interrupted or incapacitiated by the other alarm station. For a simple system, this is illustrated in Figures 14 and 15 in concept. The redundancy requirement does not mean that identical equipment is required in both stations, but that each station can independently perform the same functions.

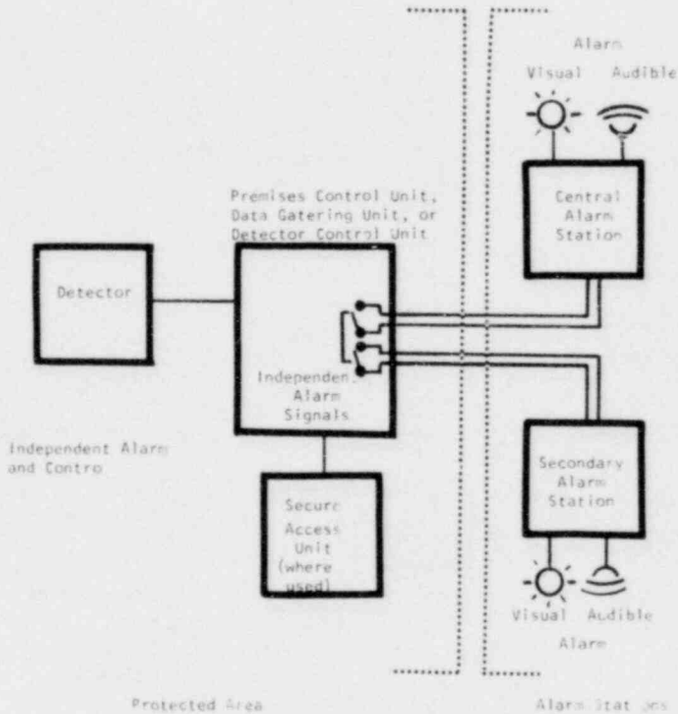
If the alarm systems is a more sophisticated system using multiplexed systems, computerized systems, or microwave transmission, the design should comply with the concept illustrated in Figure 14, even though the method may be somewhat different.

Note that the third observation post shown in Figure 15 is optional.

4.3 STATUS DISPLAY

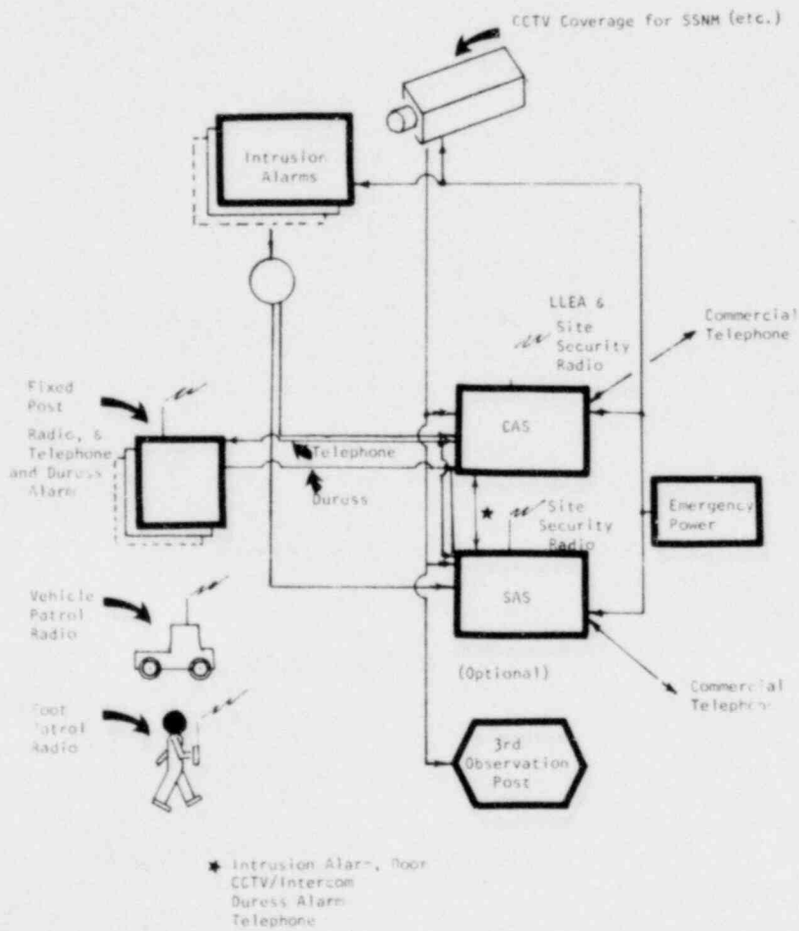
The status of each alarm intrusion detector should be displayed at all times. Typically this will be "secured" (alarm operational), "access" (alarm turned off) or "alarm" (alarm activated), It is not necessary that the CAS and SAS use the same status display scheme or type of equipment. When activated, the alarm system should provide the geographic location, time and date and the new status (alarm, false alarm, failure). The audible alarm should provide 85 db at a distance of 10 feet. A redundant audible unit should be provided.

All building and alarm openings and closings should be logged and verified by telephone or radio if scheduled or an assessment response should be initiated for unscheduled, non-verified alarms.



REDUNDANT INTRUSION ALARM CONCEPT

Figure 14



CAS AND SAS CONCEPTS

Figure 15

4.4 TAMPER-INDICATING AND SELF-CHECKING

All alarm systems should be tamper-indicating and self-checking. Tampering or failure should cause an alarm at both the CAS and SAS (see Intrusion Alarm Redundancy, Section 4.2) in the same format as other alarm systems. Control boxes, junction boxes, lines, detectors and consoles, for example, are all included. Terminal boxes and junction boxes additionally should be secured in a closed position by welding or locked and sealed.

4.5 DURESS ALARMS

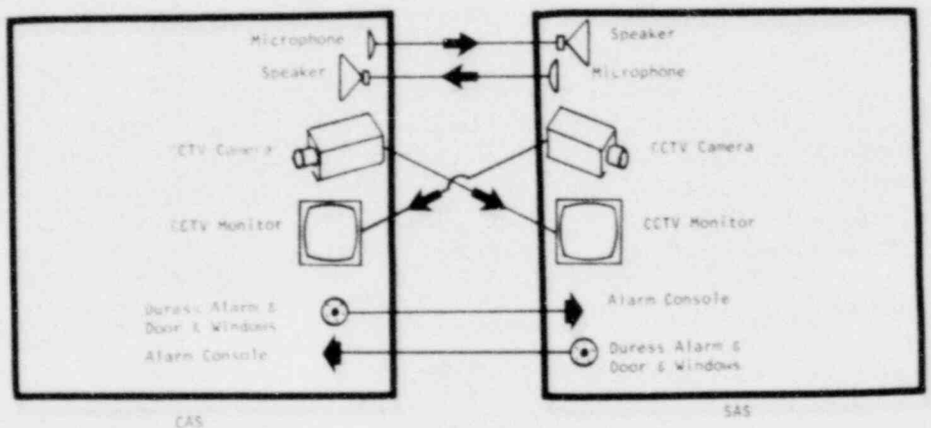
Duress alarms should be provided for all fixed security posts including the CAS and SAS. These alarms should annunciate visually and audibly at both the CAS and SAS. They should be redundant and have the same reporting format as intrusion alarms. For guards on roving patrol either a radio frequency linked alarm or a portable radio should be provided to call in alarm or duress codes. The duress alarm at the CAS should annunciate only at the SAS and the SAS duress alarm at the CAS. Reference Number 28.

4.6 CAS AND SAS INTRUSION ALARMS

Both the CAS and SAS should have intrusion alarms on doors and windows. The CAS intrusion alarm should annunciate at the SAS and SAS alarm at CAS. A continuous audio and/or CCTV link between the CAS and SAS is recommended. Reference Figure 16. A floor trap (pressure sensitive switch, etc.) external to the door of the CAS and SAS is useful to inform the operator of approaching personnel.

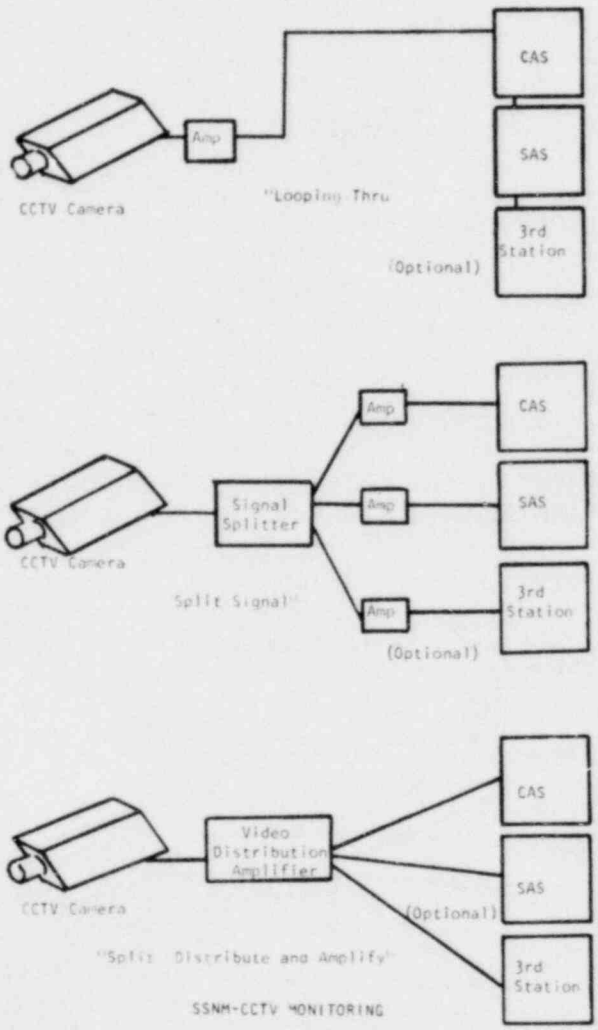
4.7 SSNM/CCTV COVERAGE

Vaults and process areas containing unencapsulated or unalloyed SSNM should be under the surveillance of closed circuit television that is monitored in both alarm stations. Additionally, means should be employed which require that an individual other than an alarm station operator be present at or have knowledge of access to such unoccupied vaults or process areas. The CCTV monitors can operate from a single camera (fixed) with a distribution amplifier, signal divider or looped-thru, provided that no individual in the CAS, SAS or third location can redirect the camera, turn it off or turn off the lights in the camera field of view. Reference Figure 17 for typical configurations. Note that the 3rd station is optional and the requirement for and location of a line amplifier is dependent upon the type of equipment utilized. CCTV signals may also be transmitted via microwave or non-coax wire system such as telephone lines, etc. Reference Number 20, 21 and 30. Reference Number 30 provides information on a tamper-resistant CCTV system.



CAS/SAS ALARM INTERFACE CONCEPTS

Figure 16



SSNM-CCTV MONITORING

Figure 17

4.8 INTRUSION DETECTION ALARM TRANSMISSION SYSTEMS.

It is recommended that intrusion detection systems which utilize cable or wire transmission have these cables and wires buried, where external to buildings and obstructions, concealed in protected inaccessable areas or open to visual surveillance within the buildings to minimize tampering potential. Junction boxes should be welded in a secured position or locked and sealed. Cables and wire systems should be enclosed in rigid conduit or metal per UL 681.

4.9 INSPECTIONS AND MAINTENANCE

Alarm equipment and circuits should be thoroughly inspected by qualified service personnel annually. They should also be thoroughly tested and inspected after maintenance, failure or system modification or expansion by the security organization. Maintenance should be accomplished in accordance with manufacturer's specifications. Spares should be considered for key areas and items which may require removal for repair purposes. Record of all maintenance activities should be kept for two years after occurance. A preventive maintenance schedule for inspection adjustment and calibration should be established. All maintenance and repair on-site will be accomplished by two trained individuals working as a team. All items repaired or provided from off-site will be inspected and tested by the two trained individuals before releasing them for use. Operation test procedures should be prepared for each alarm system and/or detector. Each alarm system should be tested at the beginning and end of each use period. If it is used continuously in excess of 7 days, it should be inspected each 7 days. If spare equipment is not online such that it can be activated by the CAS or SAS operator, it is recommended that call-out maintenance personnel be available within one hour.

5. COMMUNICATIONS

5.1 COMMUNICATIONS, GENERAL

Provisions in 10 CFR Part 73.46,"Fixed Site Physical Protection Systems, Subsystems, Components and Procedures", paragraph (f) "Communications Subsystems", provide that:

- "Each guard, watchman or armed response individual on duty shall be capable of maintaining continuous communication with an individual in each continuously manned alarm station required by paragraph (e)(5). . . who shall be capable of calling for assistance from other guards, watchmen, and armed reponse personnel, and from law enforcement authorities."

- "Each alarm station required by paragraph (e)(5) of this section shall have both conventional telephone service and radio or microwave transmitted two-way voice communications, either directly or through an intermediary, for the capability of communication with the law enforcement authorities".

- "Non-portable communications equipment controlled by the licensee and required by this section shall remain operable from independent power sources in the event of the loss of normal power."

- "The licensee shall have a test and maintenance program for. . . communications equipment. . ." Test and inspections should be accomplished during installation and construction. Preoperational test and inspections, and routine operation test and inspection should also be accomplished. Communications equipment for on-site utilization should be tested at least once at the beginning of each shift. Off-site communications equipment should be tested at least once during each 24-hour day.

- A preventive maintenance procedure should be established for all communications equipment.

- All repairs and maintenance should be accomplished by two individuals working as a team and the security organization shall be notified prior to and after service and should conduct performance verification test.

5.2 FIXED CAS AND SAS COMMUNICATIONS

5.2.1 Telephone and Intercom

The CAS and SAS should each have a telephone. This telephone system may have intra-site intercom and telephone capabilities and intermediary switchboards, but at least one dedicated line/number for the CAS or SAS which is to be utilized for off-site and emergency communications only is recommended. This number should be unlisted.

Either a telephone or intercom communication capability should be available between all fixed security posts including the CAS and SAS. It is recommended that telephone and communication lines between the CAS or SAS and security post facilities be buried underground to minimize tampering possibilities or enclosed in cable trays which are not accessable.

Telephone power is normally provided by the telephone company, however switchboards and push button lights are powered by local power. The licensee should verify that telephone communications for security purposes are either on an independent power source or tie the system into a backup power system as required to provide communication between all security posts and from the CAS and SAS to the law enforcement authorities. Normally calls can be made from a phone during a power outage but in-coming calls may not annunciate.

Maintenance will normally be performed by the telephone company. This is not a required two man operation. However, maintenance should not be performed on-site without the explicit cognizance of the site security shift supervisor. The security shift supervisor should be notified upon beginning and completing the service. Upon notification of completion all security phones should be performance checked including a test call to the law enforcement authority.

5.2.2 Radio/Microwave

Both CAS and SAS should have radio/microwave communication capabilities for on-site security and off-site communications. A minimum of two frequencies should be available including the law enforcement authority frequency and a security dedicated on-site frequency. The law enforcement authority frequency should not be used for other than daily test and emergencies as required. Additional channels may be utilized for operations and maintenance, etc. However, these extra channels should not be used for security purposes except as backup emergency. The on-site fixed and portable security radios should have a range capable of communicating to any point within the owner-controlled area. The CAS and SAS radios should additionally be capable of communicating with the

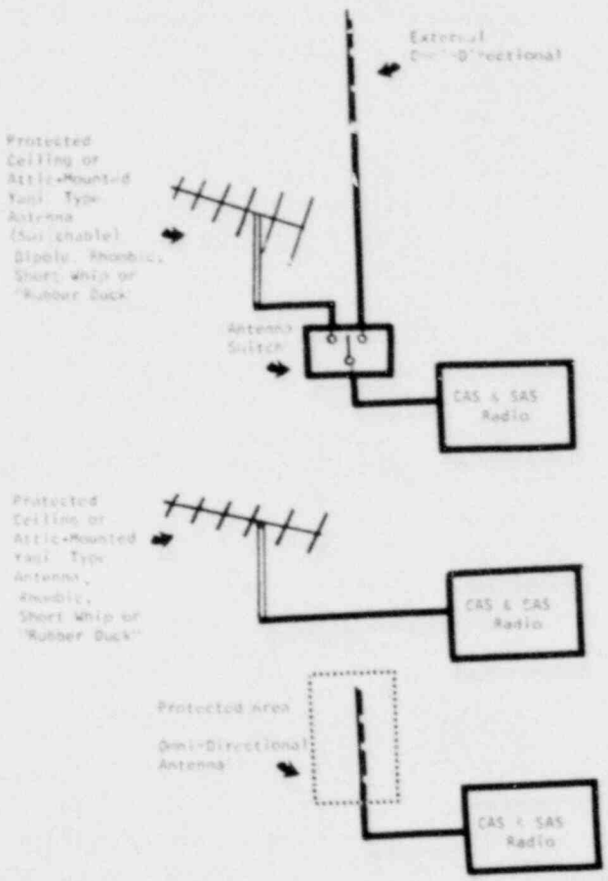
local designated law enforcement authorities fixed and continuously manned station. All security radios (portable and fixed) should have both the on-site frequency and law enforcement authority frequency.

Although external antennas may be utilized, they are subject to disablement by an adversary or perhaps weather extremes. Therefore, it is recommended that both the CAS and SAS have protected antenna or a backup protected antenna which can provide for communication both on-site and with the law enforcement authorities. Typically, omni-directional antennas are used for base stations. Generally, these are vertical antennas which are difficult to protect. As Figure 18 depicts, it is recommended that perhaps an attic, in-room ceiling, or non-visible low roof profile antenna be utilized as the antenna or back-up. A yagi type may suit this purpose. The Yagi could be directed toward the law enforcement base station and at the same time radiate enough non-directional energy for on-site use. Other options include small in-room dipoles, rhombic, short whips or "rubber ducks". Consult with an appropriate communications engineer.

A backup power supply should be provided for CAS and SAS radio communication systems. This power source may be shared with the intrusion protection backup system or may be isolated and dedicated to each CAS and SAS fixed radio (utilizing a small separate battery system). Backup power should provide for a minimum of 8 hours of continuous communication. It is recommended that the manufacturer of the communications equipment be contacted to provide advice and possibly the equipment required. Radio failure should be detectable both visually and audibly.

5.2.3 INSPECTIONS AND MAINTENANCE

Intercom, radio and microwave equipment should be tested, inspected, calibrated and maintained in accordance with the manufacturer's recommendations. A routine preventive maintenance and inspection schedule should be established and utilized. A record of this maintenance should be kept for a period of two years. Planned maintenance for the CAS and SAS radios should not be done simultaneously. It is recommended that a spare fixed base radio for either the CAS or SAS be retained on-site by the licensee or available from the radio maintenance company or vendor to preclude CAS or SAS downtime during extended maintenance requirements. Maintenance should not be accomplished on communication systems without the explicit approval of the security organization shift supervisor. Although it is not essential that radio maintenance be accomplished by two individuals, it is essential that, upon completion of repair and return to service, that the performance of the unit be tested. Fixed radios at the CAS and SAS should be checked both for on-site communication as well as law enforcement authority communication. Range and voice clarity for both transmit and receive should be verified by an operational radio check.



TYPICAL PROTECTED ANTENNA CONFIGURATIONS

Figure 18

If spare equipment is kept available and on-line, it is recommended that it be utilized 8 hours out of the 24 hour day to provide continuing assessment of its usability and status. If redundant spare equipment is not available which can be utilized by the operator, it is recommended that call-out maintenance be available within one hour.

6. OPERATIONS CONSIDERATIONS

6.1 OPERATIONS CONSIDERATIONS, GENERAL

It is the purpose of the following paragraphs to provide some operational considerations for the CAS and SAS. However, it is not intended to provide detailed orders or procedures as provided by 10 CFR Part 73.46. "The Standard Format and Content of Safeguards Contingency Plans for Fuel Cycle Facilities", Regulatory Guide 5.55, provides additional operation recommendations. (Reference Number 31).

- Written procedures including the operation of the CAS and SAS should be provided. Those pertaining to the CAS and SAS operation should be readily available at the respective stations and for emergency use and periodic review.

- Part 73.46 (b)(5) states that "within any given period of time, a member of the security organization may not be assigned to, or have direct operational control over, more than one of the redundant elements of a physical protection subsystem if such assignment or control could result in the loss of effectiveness of the subsystem". Therefore it is recommended that operators assigned to the CAS not be rotated to the SAS or those assigned to the SAS not be rotated to the CAS unless or until a complete cycle of alarm system, communication system and backup power for the same have been routinely performance checked.

- It is recommended that access to the CAS and SAS be limited to the operator, maintenance personnel as required and emergency personnel during emergencies. It should not be utilized for other general purpose security operations, meetings, training, etc.

- It is recommended that procedures be established such that the doors to both the CAS and SAS are not open concurrently. They should be kept closed and locked from the inside at all times. Before admission is granted the operator should assure that the other alarm station door is not open (via radio, telephone, CCTV or intercom).

- A specific list of personnel authorized for CAS and SAS access should be maintained. All other personnel requiring access should require specific approval of the shift security supervisor and be escorted to minimize distractions of the CAS or SAS operator.

- Keys to the CAS should not be available to the SAS operator and SAS keys should not be available to the CAS operator.

- Before access is granted by the CAS or SAS operator, access authority should be verified remotely (before opening the door) via CCTV, peephole, etc.

- A log sheet of visitors should be maintained and a record kept for two years. (Operator assignment records are kept in logs.)

- The function of the CAS and SAS operators is intrusion detection, monitoring, communication and observation. Functions should be limited to these and only other assignments which must be carried out from a bullet-resistant, controlled-access area (such as remote control of electric or powered gates or locks). The CAS should not be used as an arsenal or staging area for response personnel as these functions can cause periodic or continuous disruptions and distractions.

- To assure post and patrol integrity, the CAS operator should conduct a "roll-call" at least every 1/2 hour. The post or patrol number should be called over the phone, intercom or radio. A reply is required which indicates status "O.K." The security log should reflect these checks.

- The CAS and SAS should be continuously manned. Shift changes or rotations should not cause any discontinuance or distractions. The CAS and SAS operators are not to be considered as response personnel.

- Once each 24-hour period, telephone and radio checks sh be made with the law enforcement authorities. This assignment should alternate between the CAS and SAS. The security log should reflect these checks. If acceptable by the LLEA, once per shift is preferable.

- Once within each 7 days, all alarm and CCTV systems should be performance checked. This may be accomplished in part during normal facility opening procedures (work start-up). The security log should reflect these checks.

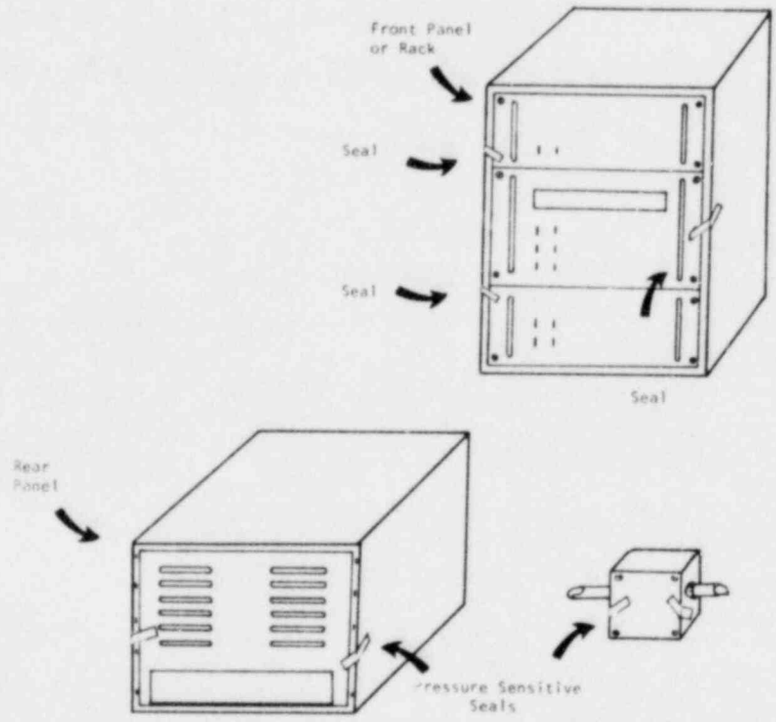
See Appendix E for a typical operation function list.

6.2 SEALS

In order to assist in assuring the calibration and operational integrity of emergency power systems, alarm system and communications equipment between calibration and service periods, it is recommended that seals be utilized. Type E seals, pad lock or pressure sensitive seals should be applied to equipment access panels, junction boxes, rack mounting screws, etc. Controls should be established to assure they are opened/broken only by authorized personnel. Appropriate controls include a monthly inspection and security organization designee observation of any seal breaking for maintenance and seal application upon completion of maintenance. NRC Regulatory Guides describing the approved methods of seal utilization are noted below. Note that the references are for information, technique and methods which may be applied.

- Regulatory Guide 5.10 "Selection and Use of Pressure Sensitive Seals on Containers for Outside Storage of Special Nuclear Material."
- Regulatory Guide 5.12 "General Use of Locks in the Protection and Control of Facilities and Special Nuclear Material."
- Regulatory Guide 5.15 "Security Seals for the Protection and Control of Special Nuclear Material."

Figure 19 illustrates several typical application areas for effective sealing.



CAS/SAS EQUIPMENT SEALING CONCEPTS

Figure 19

7. MISCELLANEOUS EQUIPMENT

7.1 MISCELLANEOUS EQUIPMENT, GENERAL

Other equipment to be considered for availability within the CAS and/or SAS includes:

- Portable camp toilet for emergency use only
- Drinking water supply (1 gallon jugs)
- Flashlights
- Gas mask adequate to protect against irritants within the CAS or SAS
- Fire Extinguishers (two or more for a total of 20 B:C and one 2A)
- Independent emergency light (wall type) with independent battery
- Tear gas, CS, MACE or other defensive gas (assure legality)
- Standard AM/FM radio (emergency monitoring only).
- Weather radio
- Lightning detector
- Wind speed and direction indicator
- Thermometer (indoor-outdoor)
- Binoculars and/or night seeing devices if utilized as an observation post concurrently.
- Quick reference emergency procedure indicator (micro-film or computer information retreival and display).
- Spotlight (if used for nighttime surveillance), can be mounted on the roof and remotely controlled from within the CAS or SAS.
- Emergency warning horns (civil defense type) for site alerts for security, safety or weather or national defense purposes.
- Sitewide PA/intercom link

- Clock (battery or mechanical power option)
- Time and date clock stamp

REFERENCES

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3. Tardif, H. P., "Materials for Improving Internal Security Equipment", Defense Research Establishment, Quebec, Canada, October, 1973.

4. Ball, G. L., et. al, "Evaluation of Improved Transparent Materials and Adhesives for Ballistic and Impact Shields", Technical Report AFML-TR-70-167, July 1970.

5. "Security Communications Systems for Nuclear Fixed Site Facilities", U. S. Nuclear Regulatory Commission, NUREG/CR-0508, (1979).*

6. Note to files regarding telephone conversation between R. Barnes and J. Robinson, November 29, 1978.

7. Laible, R. C. and M. R. Denommee, "Laminates for Ballistic Protection", USA-NLABS-TR-75-76-CE, February, 1975.

8. Prather, R. W. and L. W. Matker,"Ballistic Test Matrix for Kevlar Material,"Edgewood Arsenal Technical Report. EB-TR-76054 August, 1970.

9. Witmer, E. A., "An Assessment of Technology for Turbojet Engine Rotor Failures", March 1977.

10. Design Information, Mason & Hanger-Silas Mason Co., Inc., December 1977.

11. Collum, C. E., "Wescon Fiber Reinforced Cellular Concrete for Absorbing Small Arms Fire", Department of the Army, Waterways Experiment Station, Corps of Engineers, October 1976.

12. Dotseth, W. D. "Survivability Design Guide for U. S. Army Aircraft," Volume I, U. S. AAMRDL-TR-71-41A, November 1971.

13. "Lighting Handbook", Illumination Engineering Society, 5th Edition, 1972.

14. "Safety Standard for Burglary Resistant Electric Door Strikes", UL 1034.

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*Available for purchase from the NRC/GPO Sales Program, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, and the National Technical Information Service, Springfield, Virginia 22161.

15. "Standard for Safety--Key Locks", UL 437, Underwriters Laboratory, Inc.

16. "Standard for Safety--Combination Locks", UL 768, Underwriters Laboratory, Inc.

17. "Industrial Security Manual for Safeguarding Classified Information", Department of Defense, DOD 5220. 22-M, Ocotber, 1977.

18. "General Use of Locks in the Protection and Control of Facilities and Special Nuclear Material" Regulatory Guide 5.12, U. S. Nuclear Regulatory Commission, November 1973.

19. "Padlock, Key Operated (Resistant to Opening by Force, Pick and By-Pass Techniques)", Interim Federal Specification, FF-P-001480 (GSA-FSS) and FF-P-110.

20. "Basic Considerations of Assembling a Closed-Circuit Television System", NUREG-0178, U. S. Nuclear Regulatory Commission.*

21. "Intrusion Detection Systems Handbook" Volume I and II, SAND 76-0554, Sandia Laboratories, October, 1977.

22. Federal Specification--RR-F-191d, June 1965. (For 9 ga. wire mesh).

23. "Fire Protection Guidelines for Nuclear Power Plants", Regulatory Guide 1.120 (for comment), U. S. Nuclear Regulatory Commission, June 1976.

24. "General Fire Protection Guidelines for Fuel Reprocessing Plants" (for comment), NUREG Guide 3.38, U. S. Nuclear Regulatory Commission, June 1976.

25. "Barrier Technology Handbook", SAND 77-0777, Sandia Laboratories, April, 1978.

26. "Perimeter Intrusion Alarm Systems", U. S. Nuclear Regulatory Commission Guide 5.44, June 1976.

27. "Interior Intrusion Alarm Systems", U. S. Nuclear Regulatory Commission, NUREG-0320, February 1978.*

28. "Duress Alarm for Nuclear Fixed Site Facilities", U. S. Nuclear Regulatory Commission, NUREG/CR-0510, 1979.*

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30. Laug, O. B., et. al, "Tamper Resistant Television Surveillance System", National Bureau of Standards, NBSIR 75-707, May, 1975.

31. Standard Format and Content of Safeguards Contingency Plans for Fuel Cycle Facilities (for comment), U. S. Nuclear Regulatory Commission, Regulatory Guide 5.55, March, 1978.

32. Baer, J. L., "The Use of Field Expedient Armor, Revision 1", U. S. Army Limited War Laboratory, Aberdeen Proving Ground, December 1975.

APPENDIX A

Excerpts from UL 752 Standard for Bullet-Resisting Equipment. Note that this Standard is equivalent to ANSI SE 4.6-1973. The HPR rating is based on a .30-06 Springfield Rifle with a 220 gr. soft point bullet with muzzle velocity of 2410 ft/sec and muzzle energy of 2830 ft./lbs.

PERFORMANCE--BULLET-RESISTING MATERIALS

8. General

8.1 Test samples and materials shall be of commercial construction. The thickness of each part of the assembly subjected to tests shall be no greater than that which is produced for field use. The types of materials tested shall also be identical to those which are used in commercial production.

8.2 Five samples of each type of bullet-resisting material shall be available for tests.

8.3 Each assembly of bullet-resisting glazing material tested shall be finished to the degree that there are no visible imperfections in the materials such as delaminations.

8.4 Each test sample shall be available in a 12 by 12-inch (304.8 by 304.8 mm) size. If bullet-resisting glass, plastic, or any combination thereof is produced with a lateral dimension smaller than test sample size, then the smallest section sample shall also be tested. If test results indicate that a more severe condition would involve the testing of a larger size test sample, then the larger size samples up to the maximum overall size commercially produced shall be tested.

9. Ballistics Test

General

9.1 Balistics tests shall be conducted at close range (15 feet (4.57 m) or less) using weapons and ammunitions specified in Table 2.1 of this Standard.

9.2 Each test sample shall be mounted in a rigidly fixed frame. For each test, corrugated cardboard indicators shall be placed a distance of approximately 18 inches (467.2 mm) behind the protected side of each test sample.

9.3 Each type of bullet-resisting material shall be tested in accordance with the weapon-resisting rating assigned to it by the manufacturer.

9.5 Bullet-resisting material with a high power rifle rating shall resist one shot in the approximate center of the test sample.

9.6 These tests are to be conducted at normal room temperature, 22±3° C (71.6±5.4° F). There shall be no penetration of the projectile through the test sample, and there shall also be no spalling of material on the protected side of the test sample to the extent that fragments imbed into or damage the cardboard indicators.

9.7 A separate sample of each type of bullet-resisting material which is intended to have a small arms rating shall also be subjected to a test in which two shots are fired at the approximate center of the test sample with the shots spaced 1-1/4 to 1-3/4 inches (31.8 to 44.5 mm) apart. Spalling of bullet-resisting material from the protected side of the test sample will be accepted under this test condition but there shall be no penetration of the projectile through the material. This test is to be conducted at normal room temperature conditions, 22±3° C (71.6±5.4° F).

9.7A A separate sample of each type of bullet-resisting glazing material shall be subjected to an unsupported edge test. The sample shall be mounted in a frame with the lower edge unsupported and struck with a single shot placed midway between the vertical supports and 1 to 1-1/2 inches (25.4 to 38.1 mm) from the free edge. Spalling of bullet-resisting material will be accepted under this test condition but there shall be no penetration of the projectile through the material. This test is to be conducted at normal room temperature conditions, 22±3° C (71.6±5.4° F).
(Added Paragraph 9.7A effective May 12, 1977)

9.8 Bullet-resisting material which is intended for indoor use only shall be subjected to the spalling hazard test described above with one sample thoroughly cooled to a temperature of 13° C (55.4° F) for three or more hours and another sample shall be tested after it has been subjected to a temperature of 35° C (95° F) for three or more hours. There shall be no penetration of the projectile during the tests and there shall also be no spalling of the protected side of the test sample to the extent that fragments are imbedded into or damage the cardboard indicators.

9.9 Bullet-resisting materials intended for outdoor use such as in armored cars, windows for tellers' fixtures, etc. shall also be tested for spalling hazard with a separate sample at each of the temperature extremes anticipated in service. One sample of the material shall be tested immediately after exposure of one side to minus 31.7° C (minus 25° F) with the other side of the material at ordinary room temperature

for a period of 3 hours or more. Another sample shall be tested with the entire sample subjected to a uniform temperature of 49° C (120° F). There shall be no unacceptable spalling of material or penetration of the projectile as described above.

10. Ballistics Specifications

10.1 The tests shall be conducted with the use of equipment to record the velocity of the projectile. Each test shot shall be not less than 90 percent nor more than 105 percent of velocity rating of the ammunition used. See Table 2.1 for the velocity ratings of each type of ammunition used for test purposes. Each test shot which involves a deviation of greater than minus 10 percent of the ammunition rating shall cause the results for that particular test sample to be rejected. If the velocity rating for the ammunition used is exceeded by more than 105 percent, and there is no hazard as a result of the tests, the data can be accepted.

Note: These excerpts are not all inclusive (Acquire a current copy of complete Standards from Underwriters Laboratory).

APPENDIX B

The following tables provide information on various manufacturers or vendors who have been noted to provide bullet-resisting and/or physical security equipment. The list does not include intrusion alarm, or communications equipment or other miscellaneous equipment. Other equipment listings can be found in "Catalog of Physical Protection Equipment", NUREG 0274, December 1976; "Intrusion Detection Systems Handbook - Vol. I & II, Sandia Laboratories, SAND 76-0554 November 1976; various other references included in this report; or commercial catalogs and brochures.

The inclusion of any manufacturers name or product in this report does not constitute an endorsement but only provides a lead to additional information. Also this listing is not meant to exclude any supplier or manufacturer who may have equipment or materials which will meet the specifications.

In all cases the licensee should utilize professional assistance in determining the specific design criteria and concepts for the specific site.

Tables Included

I. Bullet-Resisting and Security Doors
II. Bullet-Resisting Walls, Ceiling and Floors
III. Bullet-Resisting Windows (Transparent Armor)
IV. Bullet-Resisting Package and Document Pass-Thrus
V. Bullet-Resisting Louvers
VI. Bullet-Resisting Gunports
VII. Manufacturers Addresses

Note: Other suppliers of UL listed materials can be found in "Accident, Automotive, Burglary Protection Equipment Directory", Underwriters Laboratory, Inc.

UL also list companies which have shown that they are sufficiently familiar with UL requirements to be listed as one or more of the following.

1. Central Station Alarm Company
2. Local Alarm Company
3. Police Station Connect Alarm Company

Companies so listed can install and provide a certificate of installation which indicates the type of installation and the extent of protection that is installed.

A catalog of all UL Standards can be ordered which shows all of the UL Standards by title and number along with cost and ordering procedures.

Underwriters Laboratories Inc.
Publication Stock
333 Pfingsten Road
Northbrook, Illinois 60062

APPENDIX B -- TABLE I BULLET-RESISTING AND SECURITY DOORS

MATERIAL OR COMPONENT	BULLET RESISTANCE	MANUFACTURER OR SOURCE
Bullet-Resisting Doors		
DR-4 (30-70) (Appx $1400-$1600)	UL-HPR Listed	Chicago Bullet Proof
DRP-4	UL-HPR Listed	Chicago Bullet Proof
Model Not Listed	UL-HPR Listed	Americraft
DA-4	UL-HPR Listed	D-F-W Co.
DAX-4	UL-HPR Listed	D-F-W Co.
BR-4	UL-HPR Listed	Johnson Fireproof Door
Model Not Listed	UL-HPR Listed	Protective Materials
Other Manufacturers of Security Doors		Dibold Mosler Safetvue Fries Correctional Equipment Midwest Architectual Metals Overly Southern Steel Gary Safe LeFebure Schwab Insulgard

APPENDIX B -- TABLE II BULLET-RESISTING WALLS, CEILINGS AND FLOORS

MATERIAL OR COMPONENT	BULLET RESISTANCE	MANUFACTURER OR SOURCE
Bullet-Resisting Materials and Panels		
Shot Tex 131 Steel ($24/sq. ft.)	UL-HPR Listed	Chicago Bullet Proof
Shot Tex 131S Steel	UL-HPR Listed	Chicago Bullet Proof
Shot Tex 4A Steel ($72/sq. ft.)	UL-HPR Listed	Chicago Bullet Proof
Shot Tex 4A1 Steel	UL-HPR Listed	Chicago Bullet Proof
Shot Tex 1221 Steel	UL-HPR Listed	Chicago Bullet Proof
Types BRSP-3,4	UL-HPR Listed	D-F-W Company
Type, HPR-1, RR	UL-HPR Listed	Overly
Model Not Listed	UL-HPR Listed	Protective Materials
Other Materials Not UL Listed		
Steel DMA-2, $25-30/sq. ft., 9.2 lbs/ft^2	30-06 V_{50} at 2750 fps	Avco
DMA-3, $25-30/sq. ft, 12 lbs/ft^2	.30-06 V_{50} at 2700 fps	Avco
Kaisaloy, $6-8 sq. ft. 5.2 lbs/ft^2	.30-06 V_{50} at 2382 fps	Kaiser Steel Co.
DPSA-6, $25-30/sq. ft, 10 lbs/ft^2	Ballistically certified for 30-06 ball	U.S. Steel, Armco, Philco Ford
Tiannium, $65-85/sq. ft., 14.1 lbs/ft^2	.30 ball	
Aluminug 7039, $12-18/sq. ft., 15.6 lbs/ft^2		
Ceramics		
B4C-W.R. Fiberglass 6.6 lbs/ft^2, 8 in. thick, $300-400/ft^2	Resisted Penetration by .30 caliber AP Projectiles	Norton, Corborundum

APPENDIX B -- TABLE II (CONT.)

MATERIAL OR COMPONENT	BULLET RESISTANCE	MANUFACTURER OR SOURCE
SiC-W.R. Fiberglass 8.5 lbs/ft^2, .8 in. thick, $150-200/ft^2	Rated for .30 Ball	Norton, Carborundum
85% AL_2O_3 Fiberglass 8.5 lbs/ft^2, .7 in. thick, $40-50/ft^2	Rated for .30 Ball	Norton, Carborundum
85% AL_2O_3 Aluminum 8.5 lbs/ft^2, .7 in. thick, $35-45/ft	Rated for .30 Ball	Norton, Carborundum
Ceramic-Glass-Plastic (PP-600, 9.2 lbs/ft.^{2}	30-06 AP at 2750 fps	AVCO
Other Ceramic		Aerojet General French Town Ceramics, Coors Porcelain, Skyline Industries San Bernadino Materials Co. KDI-Composite Technology Inc.
Concrete		
Reinforced Concrete, 6 in. w/#4 rebars on 18 in centers, 3000 lbs test Cost Approx $15/sq. ft.	HPR Resistant	
Cellular Concrete	Reference Number 11	
Cellular Concrete w/fibers	Reference Number 11	

APPENDIX B -- TABLE II (CONT)

MATERIAL OR COMPONENT	BULLET RESISTANCE	MANUFACTURER OR SOURCE
Prefab Structures		
Various Custom & Std. Designs 24x24, $21,000 to 25,000	UL-HPR Listed	Chicago Bullet Proof
Various Custom & Std. Designs	UL-HPR Available	Protective Materials
Various Custom & Std. Designs	UL-HPR Available	Overly
Other Low Co. Materials		
1 in. pine - 6 in. sand - 1 in. pine	.30 Caliber Ball Resistant	Reference Number 32
1 in. pine - 5 in. trap rock - 1 in. pine (1 1/2 - 3 in. crushed rock)	.30 Caliber Ball Resistant	Reference Number 32
Burlap Sack - 7 in. trap rock	.30 Caliber Ball Resistant	Reference Number 32
Burlap Sack - 8 in. sand	.30 Caliber Ball Resistant	Reference Number 32
Burlap Sack - 16 in. earth	30 Caliber Ball Resistant	Reference Number 32
Bricks, Common Baked Clay, 3 5/8 in., 4 lbs/ft^2 (stacked on end with 1 3/8 in. wood backing).	30 Caliber Ball Resistant	Reference Number 32

APPENDIX B -- TABLE III BULLET-RESISTING WINDOWS (TRANSPARENT ARMOR)

MATERIAL OR COMPONENT	BULLET RESISTANCE	MANUFACTURER OR SOURCE
Bullet-Resisting Glazing and Windows		
SCS-4	UL-HPR Listed	Chicago Bullet Proof
SCS11-4	UL-HPR Listed	Chicago Bullet Proof
STW-4 (3240) (Appx $1,500-1,800)	UL-HPR Listed	Chicago Bullet Proof
VWF-4	UL-HPR Listed	D-F-W Company
VW-4	UL-HPR Listed	D-F-W Company
BR4W	UL-HPR Listed	Johnson Fireproof Door
ASG-HPR	UL-HPR Listed	ASG Industries
M 36	UL-HPR Listed	Buchmir Industries
M 39	UL-HPR Listed	Buchmin Industries
AS-10	UL-HPR Listed	Chromalloy-Safetee Glass
RR 200	UL-HPR Listed	Chromalloy-Safetee Glass
BR-200	UL-HPR Listed	Globe-Amerada Glass
RR	UL-HPR Listed	LOF
Model Not Listed	UL-HPR Listed	PPG
RR	UL-HPR Listed	Texas Tempered Glass
Plexiglas	Not HPR Rated	Rohn & Hass
Lucite	Not HPR Rated	DuPont
Lexgard Laminate System MC 750	UL-HPR Listed	General Electric

APPENDIX B -- TABLE III (CONT)

MATERIAL OR COMPONENT	BULLET RESISTANCE	MANUFACTURER OR SOURCE
One-Way Mirror (Not Bullet-Resisting)		
Mirror Pane		
Clear, 1/8-1/2 in. thick light ratio 10:1 to 5:1, $6-12/ft^2	Not Bullet-Resisting	LOF
Laminated, 1/4-1/2 in. thick, light ratio 10:1 to 5:1, $6-12/ft^2	Not Bullet-Resisting	LOF
Gray, 1/4 in. thick, light ratio 4:1 to 2:1, $6-10/ft^2	Not Bullet-Resisting	LOF
One-Way Mirror		
Transview		
Clear 1/4-3/4 in. thick, light ratio 8:1, $6-15/ft^2	Not Bullet-Resisting	Environmental Glass Products
Gray, 1/4-3/4 in. thick, light ratio 4:1, $6-15/ft^2	Not Bullet-Resisting	Environmental Glass Products
Bronze, 1/4-3/4 in. thick, light ratio 4:1, $6-15/ft^2	Not Bullet-Resisting	Environmental Glass Products
Duovue		
Clear, Light Ratio 8:1, $6-10/ft^2	Not Bullet-Resisting	ASC Industries
Gray, Light Ratio 4:1, $6-10/ft^2	Not Bullet-Resisting	ASC Industries
Bronze, Light Ratio 4:1, $6-10/ft^2	Not Bullet-Resisting	ASC Industries
Other Security Window Sources	Various	Diebold Mosler The William Bayley Co. Midwest Architectual Metals Overly Mfg. Southern Steel Co. Federal Laboratories Rowland Products Insulgard

APPENDIX B -- TABLE IV BULLET-RESISTING PACKAGE AND DOCUMENT PASS-THRUS

MATERIAL OR COMPONENT	BULLET RESISTANCE	MANUFACTURER OR SOURCE
Parcel Passers Model PP/PP-4 ($1,350-1,650)	UL HPR Listed	Chicago Bullet Proof
Other Parcel Passers		Protective Materials Diebold Creative Industries Mosler Overly Insulgard

APPENDIX B -- TABLE V BULLET-RESISTING LOUVERS

MATERIAL OR COMPONENT	BULLET RESISTANCE	MANUFACTURER OR SOURCE
Louvers		
Model		
LVU-4, 2424 (5425)	UL-HPR Listed	Chicago Bullet Proof
Other Louvers and Air Guards		Diebold, Mosler

APPENDIX B -- TABLE VI BULLET-RESISTING GUNPORTS

MATERIAL OR COMPONENT	BULLET RESISTANCE	MANUFACTURER OR SOURCE
Gunports		
Model		
GP3A-4, (5505)	UL-HPR Listed	Chicago Bullet Proof
GP4-4	UL-HPR Listed	Chicago Bullet Proof
Other Gunports		Protective Materials Overly

TABLE VII

MANUFACTURERS ADDRESSES

ASG Industries Inc.
P. O. Box 929
Kingsport, TN 37662
615-254-0211

Aerojet General Corp.
Azuza, California

Amerada Glass Co.
2001 Green Leaf Avenue
Elk Grove Village, IL 60007

Americraft
Irving, CA 92714

Armco Steel
Houston, TX

Avco Speciality Materials
Lowell Industrial Park
Lowell, MA 01851

Buchmin Industries
Reedley, CA 93654

The Carborundum Co.
Armor Systems Division
P. O. Box 339
Niagra Falls, NY 14302

Chicago Bullet Proof Equipment Co.
2250 Western Avenue
Park Forest, IL 60466

Chromalloy Safetee Glass
250 King Manor
King of Prussia, PA 19406

Coors Porcelain Company
Golden, CO

Creative Industries, Inc.
959 N. Holmes
Indianapolis, IN 46222
317-632-7471

Diebold, Inc.
Canton, OH 44702
216-489-4089

Environmental Glass Products
4815 Cabot Avenue
Detroit, MI 48210
313-582-6200

Fargo Company
1162 Bryant Street
San Francisco, CA 49103
415-621-4471

Federal Laboratories, Inc.
Saltsburg, PA 15681

Frenchtown Ceramics
French Town, NJ

Fries Correctional Equipment, Inc.
102 Pleasant Street
Bromley, KY 41016
606-431-3313

Gary Safe Co.
City of Industry, CA 91746

General Electric
Plastic Business Division
Sheet Products Section
1 Plastics Avenue
Pittsfield, MA 01201

Globe-Amerada Glass Co.
Elk Grove Village, IL 60007

Great Lakes Steel
Detroit, MI 48229

Insulgard, Corp
98-34 Samaica Avenue
Richmond Hill, NY 11418
212-849-9000

Johnson Fireproof Door Co., Inc.
Rosemont, IL 60018

LOF
811 Madison Avenue
Toledo, OH 43624

LeFebure Corp.
Cedar Rapids, OH 52406

Midwest Architectual Metals, Inc.
35601 Curtis Boulevard
East Lake, OH 44094
216-942-6700

Mosler
Hamilton, OH 45012

Norton Company
Noroc Armor Products
Worchester, MA 01606

Overly Manufacturing Co.
574 W. Otterman Street
Greensburg, PA 15601
412-834-7300

Philco-Ford Corp.
Aeronautronic Division
Ford Road
Newport Beach, CA 92663

Protective Material
Holly Mill
Seabrook, NH 03874
603-474-5523

ROHM & HAAS
Independence Mall West
Philadelphia, PA 19105
215-592-3000

Rowland Products, Inc.
Kensington, CT 06037

Safelite Industries
P. O. Box 1879
Wichita, KS 67201
800-835-2092

Safetvue
152 Dwight
River Rouge, MI 48218
313-843-4600

Schwab Safe Co., Inc.
3000 Main Street
Layfayette, IN 47902
317-447-9740

Security International
San Antonio, Texas
512-661-8331

Sierracia Sylmar
12780 San Fernando Road
Sylmar, CA 91342

Southern Steel Co.
Box 2021
San Antonio, TX 78297
512-533-1231

Viracon, Inc.
800 Park Drive
Owatonna, MN 55060
507-451-9555

APPENDIX C

UL AND ANSI SECURITY RELATED STANDARDS

Safety Standard for Anti-Theft Alarms and Devices. UL 1037, ANSI S.E. 2.2-1975.

Safety Standard for Central Station Burglar Alarm Units and Systems. UL 611, ANSI S.E. 2.2-1972.

Safety Standard for Connectors and Switches for Use with Burglar Alarm Systems. UL 634, ANSI S.E. 2.6-1973.

Safety Standard for Holdup Alarm Units and Systems. UL 636, March 1973.

Safety Standard for Household Burglar Alarm System Units. UL 1023, ANSI S.E. 2.4-1972.

Safety Standard for Installation and Classification of Mercantile and Bank Burglar Alarm Systems. UL 681, ANSI S.E. 2.3-1972.

Safety Standard for Local Burglar Alarm Units and Systems. UL 609, ANSI S.E. 2.1-1972.

Safety Standard for Proprietary Burglar Alarm System Units. UL 1076, ANSI S.E. 2.9-1974.

Safety Standard for Access Control System Units. UL 294, ANSI S.E. 2.10-1975.

Safety Standard for Bullet Resisting Equipment. UL 752, ANSI S.E. 4.6

Safety Standard for Burglar Resistant Electric Door Strikes. UL 1034, ANSI S.E. 2.11-1974.

Safety Standard for Relocking Devices. UL 140, ANSI S.E. 4.4-1972.

Safety Standard for Surveillance Cameras. UL 983, ANSI S.E. 2.5-1973.

Safety Standard for Combination Locks. UL 768, ANSI S.E. 4.2-1972.

Safety Standard for Burglar Resisting Glazing Material. UL 972, ANSI S.E. 4.5-1972.

Safety Standard for Central Stations for Watchmen, Fire-Alarm and Supervisory Services. UL 827, ANSI S.E. 3.1-1972.

Safety Standard For Key Locks. UL 437.

APPENDIX D

MILITARY ARMOR SPECIFICATIONS

Military Armor Specifications which may be of interest are listed below. Reference Numbers 24, 28 and 29. It is notable that most military reports providing specific armors and performance characteristics are classified.

Steel	Wrought Homogeneous	MIL-S-12560
	Rolled Homogeneous	JAN-A-256
	Rolled Non-Magnetic	MIL-A-13259B or JAN-A-434
	Wrought High-Hardness	MIL-S-46100
	Cast	MIS-S-11356
	Face-Hardened	JAN-A-784 or MIL-A-07784
	Rolled Bonded Dual-Hardness	MIL-S-46099
Light Metal	Aluminum (2024-T4)	MIL-A-7169
	Aluminum (2039-T6)	MIL-A-46063
	Aluminum (2219-T81)	MIL-A-46118
	Aluminum (5083)	MIL-A-46027
	Titanium Alloy (Weldable)	MIL-T-46077
	Titanium Alloy	MIL-A-23556
	Magnesium Lithium Alloy	MIL-A-21648
Organic		MIL-A-17856
Non-Metallic Armor		MIL-C-12369
Ceramic Composite		MIL-A-46103
Transparent Glass		MIL-G-5485
Transparent Glass-Faced Plastic		MIL-A-46108
Armor Plate Finishing		MIL-STD-171

APPENDIX E

TYPICAL OPERATIONAL FUNCTIONS FOR THE CAS AND SAS

1. Monitor Alarm Systems

   1.1 Intrusion Alarms

      1.1.1 Protected Areas
      1.1.2 Material Access Areas and Vaults
      1.1.3 Vital Areas
      1.1.4 Controlled Access Areas
      1.1.5 CCTV Monitoring/SSNM and Other Areas

   1.2 Duress Alarms

      1.2.1 Patrols
      1.2.2 Posts
      1.2.3 CAS and SAS

   1.3 Emergency Power Alarm
   1.4 Criticality and Other Sensitive Equipment Alarms
   1.5 Fire Alarms
   1.6 Alarmed Use Areas Operating Schedule Maintenance
   1.7 Alarm Stations (CAS & SAS)
   1.8 Alarm System Control (Access, Active, Activated)
   1.9 Alarm Test and Operational Status Verification
   1.10 Alarm Maintenance Scheduling, Control and Post Maintenance Check
   1.11 Site Observation

2. Alarm or Abnormality Assessment

   2.1 CCTV Monitoring
   2.2 Visual Observation
   2.3 Dispatch of Assessment Personnel

3. Communications

   3.1 Site Security Channel Operation
   3.2 Local Law Enforcement Channel Operation
   3.3 Emergency and Security Telephone Operation
   3.4 Other Intercom and Communication
   3.5 Site Civil Defense and Disaster Warnings
   3.6 Communications Equipment Test Operational Status Verification
   3.7 Communications Equipment Maintenance Scheduling and Control
   3.8 Control and Distribution of Emergency Communication Equipment
   3.9 Post and Patrol Status Checks

4. Access Control

4.1 Personnel (Protected, Vital Material and Controlled Access Areas as Required)
4.2 Vehicle (Protected, Vital Material and Controlled Access Areas as Required)
4.3 CAS and SAS Access
4.4 Emergency Vehicle and Personnel Control
4.5 Access Authority Verification
4.6 Escort Coordination as Required
4.7 Off-Shift Access Logs
4.8 Remote Entry Control as Required

5. Contingency and Emergency Coordination

5.1 Serve as Contingency Control Center
5.2 Contingency Plan Activation and Coordination

5.2.1 National Emergencies
5.2.2 Fire
5.2.3 Natural Disaster (Flood, Tornado, Earthquake, Hurricane, etc.)
5.2.4 Radiological Incident
5.2.5 Theft or Sabotage Attempt
5.2.6 Civil Disturbance (Riot, Demonstration, etc.)
5.2.7 Bomb Threat
5.2.8 Site Closure
5.2.9 Personnel Injury and Incidents
5.2.10 Other

5.3 Mobilization of Response Force and Coordination
5.4 Local Law Enforcement Assistance Notification and Coordination
5.5 Fire and Emergency Aid Assistance Notification and Coordination
5.6 Personnel Accountability Coordination
5.7 Public Information Control
5.8 Chain of Command Notification

6. Records

6.1 Security and Communications Maintenance
6.2 Security and Communications Test
6.3 All Alarm Status Changes
6.4 CAS and SAS Access
6.5 Events and Incidents Log and Reports
6.6 Others as Required

7. Storage, Control and Distribution of Contingency Equipment

7.1 Riot Control Equipment
7.2 Fire Arms
7.3 Emergency Radiological Equipment
7.4 Other Emergency Equipment

NOTE: It is not recommended that the CAS or SAS be used for this purpose. If it is necessary, however, only the CAS or SAS should be used and not both.

8. General

8.1 Perform Periodic Drills Utilizing All Security Equipment, Personnel and Plans
8.2 Cognizance and Control of SSNM Shipments and Receipts
8.3 Emergency Power Control as Required and Fuel/Charge Monitoring

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This report documents planning guidance for Central Alarm Stations (CAS) and Secondary Alarm Stations (SAS) as provided by the U.S. Nuclear Regulatory Commissions Upgrade Rules issued in final form in FR Vol. 44, No. 230, Wednesday, November 28, 1979. It provides basic considerations for sites licensed by the NRC to possess or process formula quantities of strategic special nuclear material relative to (CAS) and (SAS) siting, construction planning, intrusion detection systems, communications, operation considerations, miscellaneous equipment and information control.

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