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INTERIM REPORT

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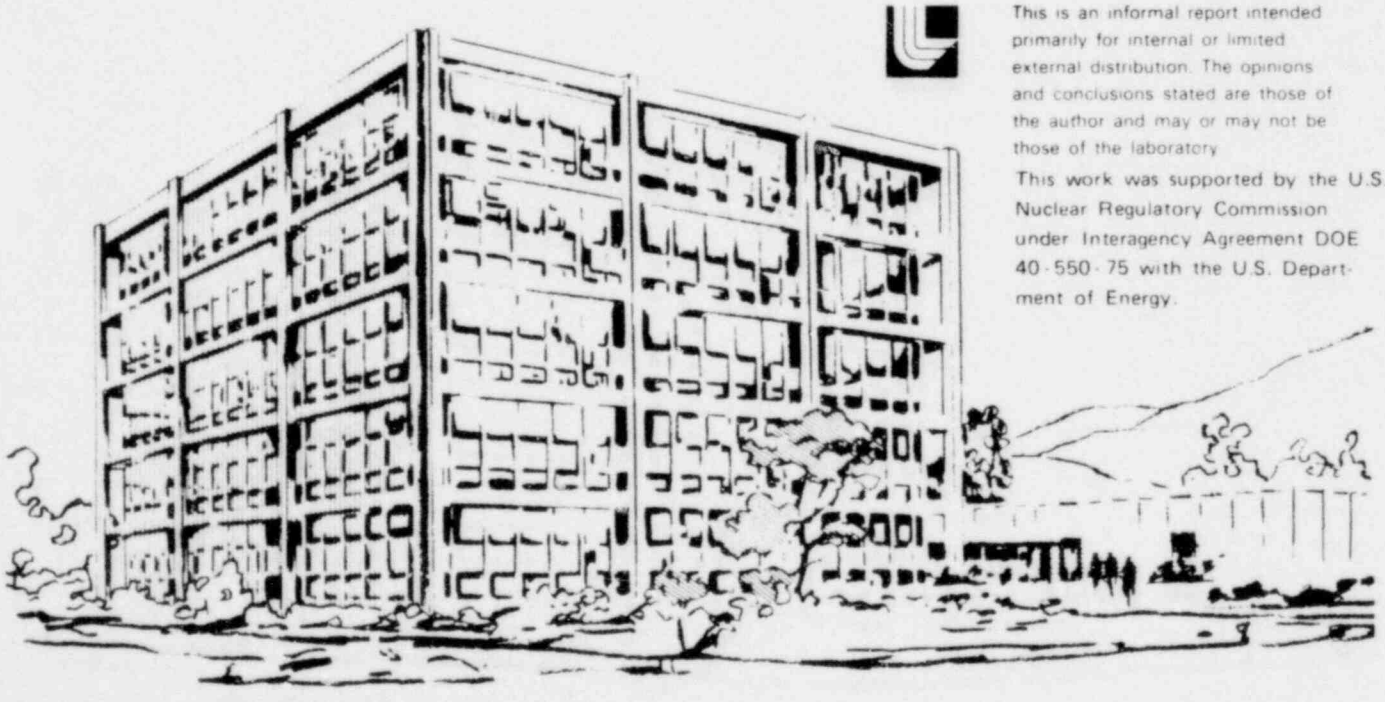
# Lawrence Livermore Laboratory

INSPECTION METHODS FOR PHYSICAL PROTECTION PROJECT:
QUARTERLY REPORT, MARCH--MAY, 1979

R. T. Bradley
A. W. Olson
F. Rogue

June 21, 1979







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## ABSTRACT

This is the first quarterly report to the Nuclear Regulatory Commission (NRC) of progress at Lawrence Livermore Laboratory (LLL) in the Inspection Methods for Physical Protection (IMPP) project. Besides presenting the activities and findings of the first half of the data-acquisition phase of the project, this report also details the present design concepts of the contractual deliverables.

## SUMMARY

### DATA-ACQUISITION PHASE

This quarterly report details the more important activities occurring during the first half of the data-acquisition phase of the Inspection Methods for Physical Protection (IMPP) project. Some of the activities presented here occurred before the Interagency Agreement between the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) that authorized this project went into effect. Such activities are included because of their effect on our data-acquisition work.

### MEETINGS

#### Atlanta

To initiate the IMPP project, team members from the Lawrence Livermore Laboratory (LLL) and SRI International (SRI) met in Atlanta, Ga., on January 16-17, 1979, with NRC representatives from the Nuclear Regulatory Research (RES) division, Inspection and Enforcement (I&E) division headquarters, and physical protection inspectors from Regions I through IV. At this meeting, we gained valuable insight into the problems and needs of the I&E physical protection inspection process as viewed both by the inspectors and by headquarters staff.

#### Washington, D.C.

In two separate trips, LLL IMPP project team members met first with representatives of NRC RES at headquarters in Silver Springs, Md., and then held a joint meeting with I&E at headquarters in Bethesda, Md. During the first trip, on February 12-15, 1979, we were given an overview of the development of inspection methods to date. During the second trip, on May 23-24, 1979, we discussed our findings and the I&E requirements for the types of technical information to be included in our deliverables.

## Region Contacts

As a part of our site visits, to be discussed later, we met with our Region contacts in Regions I, III, and V, with whom we discussed the problems of the inspectors in the field.

## Site Visits

To get acquainted with the inspection process, we joined Regional physical protection inspection teams to observe inspections of the power reactors at Dresden in Illinois and San Onofre in California. We also observed the inspection of a transportation activity between Wood River Junction, R.I., and Dulles International Airport.

We had the opportunity, while at the Dresden reactor, to visit the Morris Spent-Fuel Storage facility. Also, while visiting to ask for assistance in tests of the Site-Specific Physical Protection Equipment Inventory questionnaire, we were able to tour the Allied General Nuclear Services (AGNS) fuel-reprocessing facility in South Carolina and the Zion power reactor in Illinois.

## Deliverables

Our meetings, site visits, conversations, and document search to date have suggested to us that we should consolidate our many deliverables into four main packages:

- Physical Protection Profiles.
- Inspection Methods for Physical Protection.
- Inspector's Guide to Physical Protection Equipment.
- Multimedia Training in the use of the deliverables.

# INTRODUCTION

The Inspection and Enforcement division of the Nuclear Regulatory Commission is charged with inspecting civilian nuclear facilities to determine their conformance to Federal Regulations. As a part of this process, physical protection equipment and procedures must be inspected. The existing large body of information on physical protection is not presently in a form or a format that is readily usable by an inspector during an inspection of that equipment. The Lawrence Livermore Laboratory Inspection Methods for Physical Protection project will identify the information needed by the inspectors, will produce that information in a form usable in the field, and will train inspectors in the use of that information.

# MEETINGS

## ATLANTA

To initiate the IMPP project, team members from LLL and SRI met in Atlanta, Ga., on January 16-17, 1979, with NRC representatives from Nuclear Regulatory Research division, Inspection and Enforcement division headquarters, and with a group of I&E physical protection inspectors from Regions I through IV. At this meeting, we gained valuable insight into the problems and needs of the I&E physical protection inspection process as viewed both by the inspectors and by headquarters staff.

Because of the Atlanta meeting's importance in giving direction to the IMPP project, we include here a compilation of our notes from the meeting, in rough chronological order. If remembered, the person commenting is identified in parenthesis after a note. After the notes are some of our comments and impressions:

- Inspectors test functions, not equipment. Function testing methods are not consistent (F. Gillespie, Region II).
- The two major problems facing NRC inspectors are those of ascertaining compliance with NRC rules and regulations, and facility evaluation. The basis for inspectors' function in these two areas is the Upgrade Rule, and the changes to the Upgrade Rule which are already underway. The LLL study will be producing quarterly progress reports, which will be reviewed and commented upon by the NRC Regions personnel. The review process will shape the direction and emphasis of the LLL study (D. Chapell, I&E headquarters).
- The Regional inspectors need a guide that will tell them how many and which components of an alarm system need to be tested to determine compliance. If it is impractical to test all items, what percentage (sample size) needs to be tested to obtain a desired confidence level (statistical validity)? What procedure should be used to select the test sample (sampling structure)? The length of time it takes to

implement a procedure should be taken into account in structuring inspection procedures (scheduling problem). The inspection procedures should be uniform in terms of evaluating the licensee's procedures (J. Donahue, Region III).

- Requirements for locks and keys should be modified. Current requirements do not include:
  1. Documentation on individuals in the past who had access to keys or combinations.
  2. Records of who have been discharged or transferred.
  3. Records of what action, if any, has been taken on changing locks or combinations.
- Inspectors should not have to rely on review of records kept by licensees. Records can be falsified. In fact, there are some cases pending in court at present on such falsification.
- The false alarm rate (FAR) is an important parameter. The inspector checks the licensee's response to false alarms and for high false alarm rates in the system.
- Licensee's procedures are not reviewed by NRR or NMSS, only by inspectors. The inspectors would like to know what the minimum procedure is that is adequate to evaluate compliance. If inspectors guidelines are changed, then parallel guidance must be submitted to the utilities.
- At this time, there is no existing document control system for pertinent NRC memoranda in the Regions. Such a system would assist the inspectors in finding what decisions or considerations have been given to situations in the past (F. Gillespie, Region II).
- Frank Gillespie would like to test sensors without regard to sensor type. He would also like to see inspection test procedures that do not require test instruments, even a multimeter.
- Don Chapell disagreed with Gillespie. He said that some test equipment may be necessary. If a procedure requires the use of test equipment, training will be provided in the use of such equipment. Perhaps some test equipment could be left on the premises, giving the licensee access to its use. The inspectors should not get too concerned if the test procedures become more technical. Training in performance of such procedures will be provided.

- Inspection criteria should be backed by regulatory requirements. If an inspector finds something wrong, he should be able to cite a specific rule in order to make his findings stick.
- Licensees are at the mercy of vendors who select, supply, and install their security systems. Inspectors cannot be used by the licensees as consultants in the design and installation process. They can only make ex-post-facto determination of system deficiencies. The inspector training should cover what items should be inspected. (An example of vendor-caused deficiencies: indoor-type connectors used outdoors, resulting in corrosion and disabling the system.)
- The experience and judgment abiiity of inspectors varies greatly. Inspectors range from GS-7 to GS-13. Shouldn't we reflect on our procedures or modules the GS rating so we would assign an inspector with the appropriate capabilities (F. Gillespie, Region II)?
- No! Capability does not necessarily correlate with the GS rating. Instead, the required capabilities should be stated (e.g., training prerequisites) (R. Caldwell, Region IV).
- Could the equipment catalog and evaluation guide be made pocket size to make them more handy (J. Creed, Region II)?
- Are the Mitre handbooks being used by the regions?

  Region I - Yes.
  Region II - No.
  Region III - No.
  Region IV - Sometimes, maybe.
  Region V - Not represented--the writers recollect from visit to Walnut Creek that they were not used.

- Negative comments on the Mitre handbooks were:

  1. Includes little usable information.
  2. Procedures are too complex.
  3. Not specific enough.
  4. Recommends tests with nonexistent or sophisticated test equipment.

- What is really needed are detailed evaluation procedures (F. Gillespie, Region II).
- At this point, Gene Richard (RES) stated that International Research Associates are being contracted to provide four security alarm systems

on panels for training purposes (ultrasonic, microwave, passive IR, and balanced magnetic switch).

- Gene Richard's presentation:
  1. Quarterly reports will be generated by LLL/SRI and will be sent to the Regions for comments.
  2. There will be another meeting of inspectors in about four months, maybe in San Francisco.
  3. LLL and SRI personnel will go along with inspectors to observe, first-hand, the inspection process.
  4. The new equipment catalog will only include data on the equipment currently installed, or planned for installation on NRC-licensed facilities.
  5. NRC testing criteria must be developed. They will be synthesized after evaluating the testing criteria developed by other government agencies; e.g., MERADCOM, Sandia, etc.
  6. We (LLL/SRI) will prepare a list of equipment that needs to be tested.
  7. Uniformity of test procedures will be emphasized.
  8. Each of the tests to be performed by inspectors will be backed up by a regulatory rule.
  9. The feasibility of a multipurpose test instrument, especially developed for NRC inspectors, will be addressed.
  10. The assessment of the feasibility, and the development of a catalog and evaluation guide of physical security Administrative and Operational Procedures will be a difficult task to undertake. It will have to touch on guard training, contingency rules, and other functions currently outside the scope of the Statement of Work.
- In preparing any of the documents to be used by the inspectors, remember the motto: "KISS: Keep it simple, stupid" (J. Creed, Region III).
- Gene Richard added two items to the list of deliverables:
  1. I&E Compliance Manual.
  2. I&E Evaluation Manual.
- It was suggested that LLL/SRI develop a questionnaire to go with the quarterly reports to the Regions (J. Donahue, Region II).

- The comments and answers from the Regions should be funneled through the I&E headquarters before being returned to LLL/SRI. This is to insure that the HQ future needs can be satisfied. However, the outgoing questionnaires should be sent directly to the Regions, in order to expedite the process (D. Chapell, I&E headquarters).
- LLL/SRI personnel should accompany inspectors on field trips during the next three months. In particular, such trips should cover the following:
  1. Power reactors.
  2. A nonpower (research) reactor.
  3. A fuel-cycle facility.
  4. A spent-fuel facility.
  5. Transportation of SNM.

If possible, most of these trips should be within Region V, for LLL/SRI convenience. Transportation inspection should probably be made in Region III, as Chicago has had the most experience in inspection of SNM shipments (probable location, Columbus, Oh.?).

- Don Chapell will receive inputs from the Regions on the site locations they think would be best to visit. Jay Durst suggested that at least three power reactors should be visited. This would allow us to see how the I&E inspector performed in a functional manner.
- Don Chapell will come up with a list identifying a one point contact from each Region.
- Don Chapell will make available to LLL the facility physical protection equipment inventory conducted by inspectors for Mitre about two years ago.
- Would it be possible to codify sensitive (e.g., site-specific) information, and classify the codes? The consensus seemed to be against this suggestion, on the basis of practicality, and the fact that much sensitive information is already in the public domain because of the Freedom of Information Act, such as in the Sandia and SRI handbooks (R. Caldwell, Region IV).
- Regarding test equipment, the study should address equipment calibration and repair. It should identify laboratories where periodic calibration and repair should be performed. Currently, there is no standardization of test equipment (light meters). Regions

should be told (in test and evaluation guides) how many and what kind of test instruments they should have available (taking into account use requirements, repair/calibration down times). Calibration schedule will be of prime importance in determining and documenting noncompliance. The study should produce calibration standards, tool/equipment standards, indicate tool/equipment sources. Test standards should be specific; e.g., a metal detector should be tested with a specified mass, shape, type of metal, specifying location and speed, etc. Also needed are test schedules, required quantities, and cost of test equipment.

- If the equipment turns out to be inoperative during inspection, but the licensee has tested the equipment within the required period, this does not represent noncompliance. (The licensee cannot be cited; however, he is required to undertake appropriate compensatory steps.) Suggestion: Could the forthcoming manuals undergo a review by NRC legal staff (J. Creed, Region III)?
- Don Chapell answered that inspection procedures must meet rules and regulations. I&E will take over concern regarding appropriate legal steps. This is outside the scope of this study.
- During rush hours, some operators crank down the sensitivity of metal detectors below the required threshold, then crank it up to meet compliance requirements. Suggestion: Include a tag for last sensitivity settings and make it impossible for the operator to adjust setting.
- Don Chapell said that incorporation of human factors in this study is important. He also stated that resources (people) should be considered:
  1. When inspections should be done (quarterly, semi-annually, annually, etc.).
  2. How long should it take.
  3. What resources required (number of people).
  4. Identify greatest areas of vulnerability/criticality.
  5. Recommend specific frequencies of visits.
- The inspection/test procedures, to be developed by LLL/SRI should prioritize inspectors' tasks and rank-order them in terms of the criticality of the equipment and systems to be inspected. The

frequency of inspections should be provided (D. Chapell is quite insistent on this point). Statistical rules for validity of testing large numbers of similar components should be developed, and their regions of validity (confidence level?) vs population (valid up to what point?) stated. There was division on the issue whether the time (number of hours) needed to perform each test should be stated in the procedures manual, or whether the test durations should be developed by the inspectors ex-post-facto.

- Additional information on equipment tests involving commercial and military physical protection equipment should soon be available from NAVALEX, which has a $34 million test and evaluation program. Chuck Hendren is the contact.
- Jay Durst mentioned that the Guard Training and Qualification Evaluation project is to be released in the near future. This effort deals with the people part of the man/machine interface and will directly tie to the hardware effort.
- Fifteen sites have on-site, resident inspectors. Such inspectors perform security and safety inspections. The "modules" that have been prepared for the on-site inspectors probably should not be altered in this study ("don't mess with them").
- If sensor tests should require two or three inspectors, rather than one, you will be decreasing the number of trips per year. A larger number of shorter trips does provide better inspector visibility, which is preferable (F. Gillespie, Region II).
- If the study shows that there are not enough inspectors, so be it! Let's not worry too much about inspector resources (R. Caldwell, Region IV).
- D. Chapell's response to the SRI suggestion that inspection frequencies must have evolved from years of experience, and should not be altered too lightly by LLL/SRI was that the only criteria for developing inspection frequency had been: inspector visibility on-site and increasing the site time; i.e., instead of a single annual inspection, an inspector might make five separate trips and test different elements and procedures each time.

Some of our comments or impressions on the meeting at that time were:

- The attendees at the meeting made it "perfectly clear" that they want something simple to use, beneficial, and tied to regulations so they have "a leg to stand on."
- The mood after the start of the January 17 session was that everyone is involved and we have to help each other to make this project a success.
- The compliance manual may not be feasible, until and unless there is a fair degree of uniformity in the licensees' security plans. No such uniformity presently exists. An example cited by Jim Donahue prior to the meeting were the two research reactors, one at Purdue University with a security plan of "about a page and a half," and one at Westinghouse, with a security plan "about an inch thick." Compliance verification for the second requires a much more complex procedure than for the first. Also, note that a more detailed and specific security plan is more conducive to detecting violations, whereas a facility with a very brief and general security plan cannot be cited for violations, although the degree of security provided by such facility may be very inferior. For this reason, SRI believes, and LLL concurs, that a uniform compliance manual is not currently feasible.
- SRI believes the "Evaluation Manual" to be a duplication of the "Evaluation Guide," already listed in the list of deliverables. If not, in what way are they different?
- Leaving test equipment on the premises and allowing the licensee to use it could lead to intentional miscalibration, with the intent to mislead the inspectors.
- A statistical approach to testing for compliance puts you in the world of probabilities and confidence levels. Probability of detection ($P_D$) is a number that RES and I&E do not feel comfortable with. Would they feel comfortable testing a representative sample?
- The profile development and other input tasks cannot start until we have the facilities equipment input.
- The Guard Training and Qualification Evaluation project is to be released in the near future. This effort deals with the "people" part of the man/machine interface and will tie directly with the hardware

effort. This project should reside at LLL or at least in an area where close coordination could be guaranteed.

- It should be noted at this point that the "facilities equipment lists," as site-specific physical protection equipment inventory lists were called in this meeting, are nonexistent.

WASHINGTON, D.C.

In two separate trips, LLL IMPP project team members met first with representatives of NRC RES at headquarters in Silver Springs, Md., in February 1979, and then held a joint meeting with RES and I&E at headquarters in Bethesda, Md., in May 1979.

February Meeting

During the first meeting (February 12-15, 1979), we were given an overview of the development of inspection methods to date, and headquarters' views of the technical documentation needs of the physical protection inspector. From this meeting, we gained the following:

- Headquarters' view of the inspector's needs and the inspector's own view of his needs are not always compatible.
- We should avoid hardening our judgment on the requirements of the IMPP project until all the data are in. Our ideas will be subject to radical change as the various inputs come in, and this has been the case.
- There are no lists presently available to the NRC showing site-specific application of physical protection equipment presently in use. Individual inspectors may have assembled site-specific packets of information on their own, but this information is not necessarily complete or generally available.
- The deliverables we produce should be designed to transmit the maximum amount of usable information in the minimum amount of words, should be easily understandable, and should "have a flavor all their own."

May Meeting

During the second meeting (May 23-24, 1979), we discussed our findings to date, and the I&E requirements for the types of technical information to be included in our deliverables. We presented a proposed model of the Inspection Methods for Physical Protection deliverable based on the I&E Inspection Modules for Power Reactor Physical Protection. (This model is discussed later, and is shown in Appendix A.)

From this meeting, we gained the following:

- Our Inspection Methods for Physical Protection deliverables have been given the highest priority of all of our deliverables by I&E headquarters.
- Equipment specific deliverables, such as the Inspector's Guide to Physical Protection Equipment, are of lower priority to I&E headquarters.

REGION CONTACTS

As a part of our site visits, to be discussed later, we met with Region contacts in Regions I, III, and V, with whom we discussed the problems of the inspectors in the field. We found these contacts to be very helpful in answering our questions, and in providing us with copies of any documents that were mentioned in our talks.

From these contacts and from the inspectors we observed on site visits, we gained the following:

- Inspectors come from diverse backgrounds, and therefore they tend to inspect most heavily in areas that correspond to their own expertise. This contributes to variations in inspection methods from inspector to inspector, and from Region to Region.
- Most inspectors feel that they lack the technical background to make judgments in matters concerning electronic equipment.
- The inspectors' use of a reference document is inversely proportional to the difficulty of finding and understanding the information in it.
- We were impressed by the dedication of the inspectors to their jobs.

## SITE VISITS

To get acquainted with the inspection process, we observed Regional physical protection inspection teams during their inspections of two power reactors and one transportation activity. We also visited a fuel-storage site, a fuel-reprocessing site, and another power reactor, but not during inspections.

### DRESDEN STATION

During the week of February 26, 1979, two members of the IMPP project team observed an inspection of the power reactors at the Commonwealth Edison Dresden Station in Region III near Morris, Ill. We joined the inspection team there after the inspections began.

The inspection at Dresden was complicated by construction, heavy snowdrifts, and by a transformer fire that occurred just prior to our visit. We were able to observe the inspections of the physical protection equipment in the protected area, the vital area, the CAS and the SAS. We were also able to observe the inspection of the guard force records and procedures.

Due to complications during this inspection, we had to return before the inspection was completed.

### SAN ONOFRE STATION

Also during the week of February 26, 1979, a member of the IMPP project team observed an inspection of the power reactors at the Southern California Edison San Onofre Station in Region V near San Clemente, Ca. We were fortunate to observe almost all of this inspection from the preinspection to the postinspection processes.

## TRANSPORTATION ACTIVITY

During the week of May 28, 1979, a member of the IMPP project team observed the inspection of a SNM transportation activity between the United Nuclear Corporation facility at Wood River Junction, R.I., and Dulles International Airport.

Due to a complication with security clearances, we were unable to observe the inspection of the loading process, but we were able to observe the inspection of the rest of the transportation activity to its completion.

## NONINSPECTION SITE VISITS

During the Dresden Station visit, our Region III contact arranged for us to visit the General Electric Spent-Fuel Storage facility at Morris, Ill. To request a trial run of our Site-Specific Physical Protection Inventory, we visited the Allied General Nuclear Services (AGNS) fuel-reprocessing facility at Barnwell, S.C., and the Commonwealth Edison Zion Station at Zion, Ill.

On these noninspection visits, we were able to observe the physical protection systems in use at the facilities, and were able to discuss the licensee's problems in the physical protection area.

## THE INSPECTION PROCESS

From the three inspections we observed, we have arrived at a composite model of the inspection process. The inspection process, as we see it, is logically divided into three steps: the preinspection process, the inspection itself, and the postinspection process.

### The Preinspection Process

The preinspection process, as shown in Fig. 1, starts with the scheduling of the inspection. As the inspection date nears, any site-specific documents are

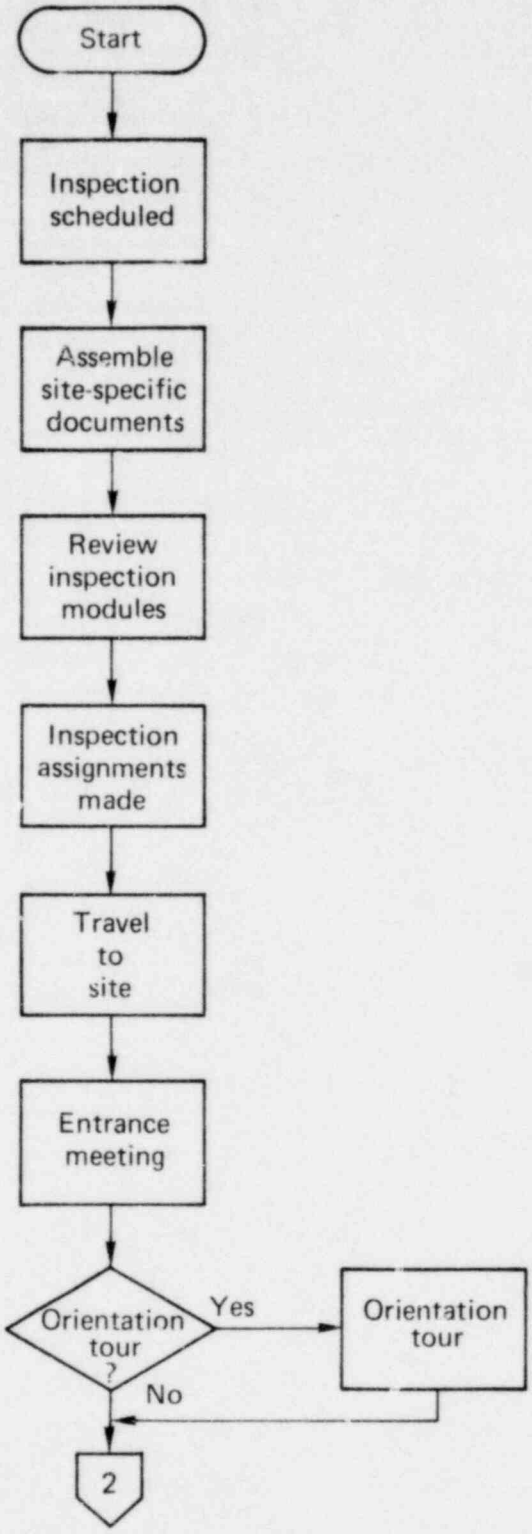


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FIG. 1. Preinspection process.

assembled, the applicable inspection modules are reviewed, and inspection assignments are given to the members of the inspection team. The team then travels to the site being inspected where they hold an entrance meeting with the site security administrator and the site management to cover the purpose and schedule of the inspection, and to arrange for the help of any site personnel necessary to the conduct of the inspection. At this point, the inspectors may request--if there have been any changes to the physical protection systems since their last inspection, or if new members of the inspection team are present--an orientation tour of the site.

## The Inspection Process

The inspection itself, as shown in Fig. 2, begins after the entrance meeting, or the orientation tour. The inspection consists of a series of judgments and evaluations that must be made at each step. At each item inspected, the inspector must decide if he has enough information available to make the necessary judgment, either within his own knowledge and background, or in his briefcase. If he doesn't have the information, then he must obtain it.

The inspector must judge whether each item performs the intended function, and whether that function complies with the intent of the applicable regulation and security plan. If, in the inspector's assessment, the item meets the requirements of the regulation or the security plan, but does not meet the intent of either or both, he will record that item as a concern. This is the most nebulous part of the inspection process--a part wherein the licensee may be in technical compliance, while not actually meeting the functional requirement.

If the inspected item is in noncompliance to the applicable regulation or security plan, that noncompliance is recorded. In some instances, the noncompliance may require that the inspection be terminated.

When all items have been inspected, the inspection itself is evaluated and a series of notes are assembled for the exit meeting.

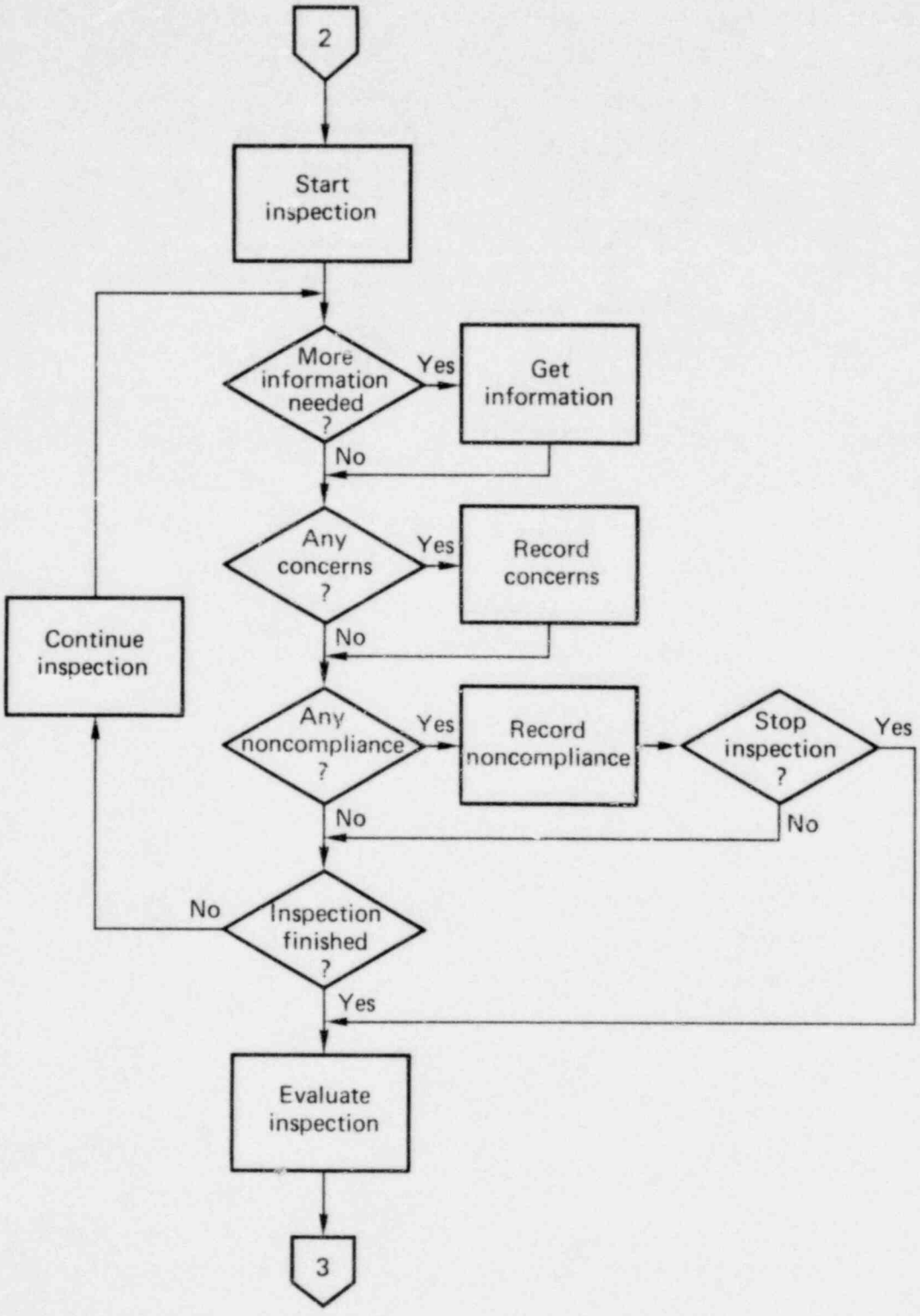


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FIG. 2. Inspection process.

## Postinspection Process

The postinspection process, as shown in Fig. 3, begins with the exit meeting, wherein the findings of the inspection are presented to the site security administrator and to the site management. Noncompliance items and concerns are discussed, along with any other pertinent comments on the physical protection system in general.

The inspection team then returns to its offices to write the inspection report.

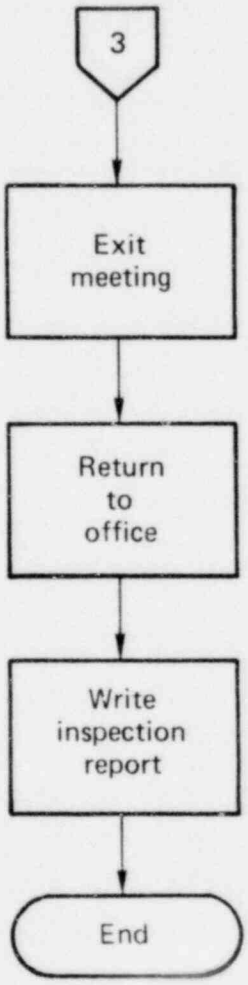


FIG. 3. Postinspection process.

## DELIVERABLES DESIGN AND STATUS

Our meetings, site visits, conversations, and document search to date have suggested that we should consolidate our many deliverables into four main packages:

- Physical Protection Profiles.
- Inspection Methods for Physical Protection.
- Inspector's Guide to Physical Protection Equipment.
- Multimedia Training in the use of the deliverables.

### PHYSICAL PROTECTION PROFILES

The Physical Protection Profiles are intended to present a model protection system for each of the four main facility types:

- Power reactors.
- Research reactors.
- Fuel-cycle facilities.
- Transportation facilities.

The input for each of the profile types will be obtained from a Site-Specific Physical Protection Equipment Inventory from each NRC-licensed site.

### SITE-SPECIFIC PHYSICAL PROTECTION EQUIPMENT INVENTORY

The need for the Site-Specific Physical Protection Equipment Inventory was primarily for input to the Physical Protection Profiles. We quickly determined that we should limit the contents of our equipment-oriented deliverables to the physical protection equipment actually installed, or soon to be installed, by the licensees, as shown in this inventory. We also determined that this inventory would produce a bonus deliverable for the NRC: Site-Specific Physical Protection Equipment Lists for use by inspectors in preparing the inspections.

At the request of RES, we have prepared an inventory questionnaire, with directions for its use. We have taken this questionnaire to AGNS at Barnwell, S.C., and to the Dresden Station at Zion, Ill., for trial inventories. These trials will permit us to fine-tune the questionnaire and its directions for use before the inventory is made industrywide. When these trials have been completed, we will need to have NRC headquarters provide the authority for requesting this inventory from the licensees.

Due to the delay in obtaining this inventory, the Physical Protection Profiles and associated deliverables have been given a low priority at this time.

## INSPECTION METHODS FOR PHYSICAL PROTECTION

We now see the Inspection Methods for Physical Protection deliverable as a set of new sections added to the I&E inspection modules presently in use. We will add sections to the Physical Protection Inspection Methods for power reactors, research reactors, fuel-cycle facilities, and transportation, as appropriate, to arrive at the following general format:

| | |
|---|---|
| Section I* | Inspection Objectives |
| Section II* | Inspection Requirements |
| Section III* | Inspection Guidance |
| Section IV | Inspection Assessment Criteria |
| Section V | Inspection Compliance Criteria |
| Section VI | Inspection Technical Considerations |
| Section VII | Inspection Environmental and Adversary Considerations |
| Section VIII | Applicable Regulations, Regulatory Guides, and Documents |

The major inputs to this deliverable, as shown in Fig. 4, are:

- Federal Regulations--10 CFR Part 73.
- NRC Regulatory Guides.
- NRC staff positions.

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*Unchanged from the existing I&E inspection modules.

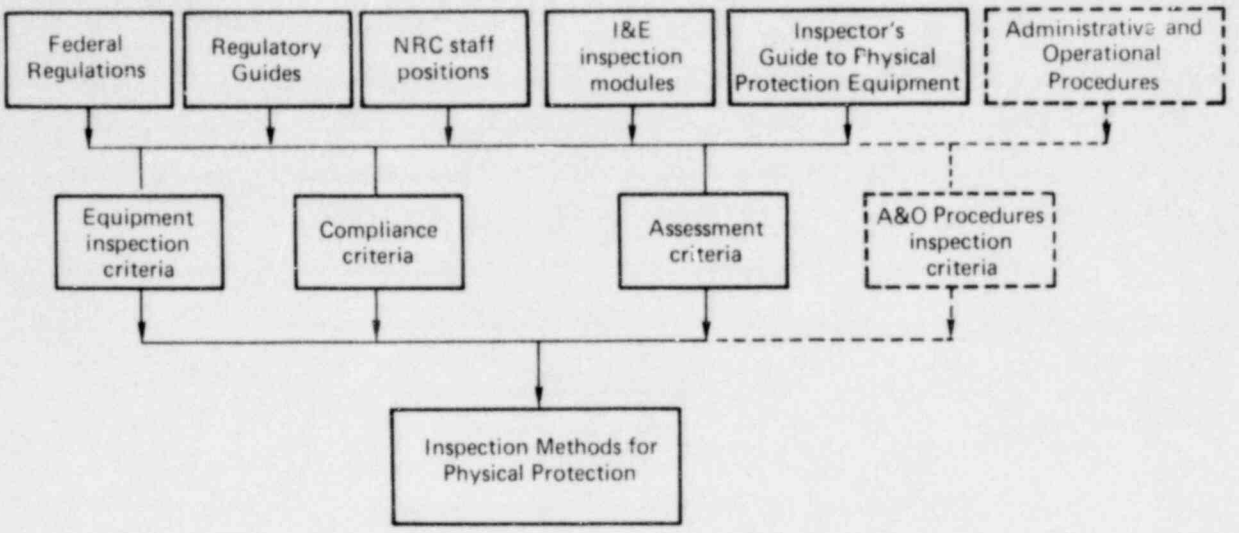


FIG. 4. Deliverables: Inspection Methods for Physical Protection.

- I&E inspection modules.
- Inspector's Guide to Physical Protection Equipment.
- Administrative and Operational Procedures.

A model of the lighting inspection module is shown in Appendix A in abbreviated form.

INSPECTOR'S GUIDE TO PHYSICAL PROTECTION EQUIPMENT

We hope to make the Inspector's Guide to Physical Protection Equipment deliverable a meaningful document by limiting its coverage to physical protection equipment presently in use or soon to be installed by the NRC licensees, as determined by the Site-Specific Physical Protection Equipment Inventory. Because of the delay in making the inventory, we are giving low priority to this deliverable at this time. When the inventory results are in, or when we determine that the inventory cannot be made, we will give this deliverable a higher priority.

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We now see this document as one or more 4.25 × 5.5-inch handbooks, in pocketbook format. The information will be presented generically. The common specifications and operating characteristics, the common effects of environment and adversary action, and the common methods of testing and maintenance will be listed under the generic heading, and as much information as possible will be presented in tabular form. Where specific pieces of equipment have important differences from the generic data, these differences will be presented by manufacturer and model number in tabular form. All of the equipment in each generic category will also be identified in a tabular format by manufacturer and model number.

The major inputs to this deliverable, as shown in Fig. 5, are:

- The Site-Specific Physical Protection Equipment Inventory
- Vendor specifications.
- Independent laboratory tests.
- Environmental effects matrices.
- Adversary effects matrices.

An outline of the Inspector's Guide to Physical Protection Equipment, with figures showing hierarchical structures, is shown in Appendix B.

MULTIMEDIA TRAINING

We will not expend any effort in designing our Training deliverable until we have hardened the design of our deliverables.

OTHER DELIVERABLES

The Administrative and Operational (A&O) Procedures feasibility study is still in progress, postponing the decision on this deliverable until later. No work will be started on the Equipment Needing Testing (Task II) deliverable until the Inspector's Guide to Physical Protection Equipment is well under way.

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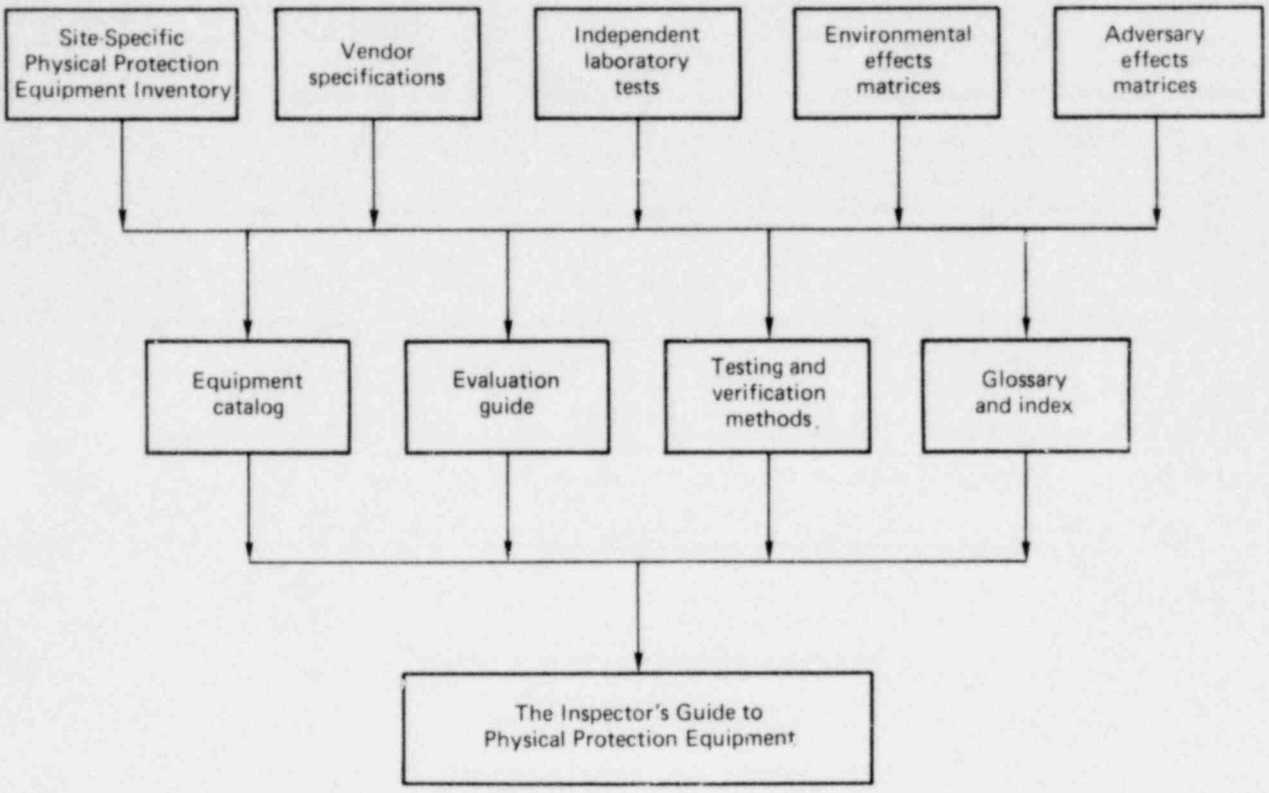


FIG. 5. Deliverables: Inspector's Guide to Physical Protection Equipment.

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# APPENDIX A

## MODEL OF

## LIGHTING INSPECTION MODULE

## SECTION I
## INSPECTION OBJECTIVES

To ascertain whether the lighting provided the isolation zone and protected area conforms with the physical security plan and regulatory requirements.

## SECTION II
## INSPECTION REQUIREMENTS

1. Verify by measurement during each inspection that isolation zones and all exterior areas within the protected area are illuminated to not less than 0.2 footcandle measured horizontally at ground level.

2. Verify by observation during each inspection that illumination of isolation zones and the protected areas permit monitoring and observation of persons and activities within these areas by the unaided human eye, CCTV, or any other means being used at the site.

## SECTION III
## INSPECTION GUIDANCE

10 CFR 73.55(c)(5) details the requirement for illumination. The American National Standard Practice For Protective Lighting (RP-10, #A85.1-1956, revised 1970) provides useful information on the application of various types of protective lighting. Chapter 4, Section 4.3, of the Security Plan Evaluation Report (SPER) Workbook, Revision 1, dated Jan. 1978, provides criteria acceptable to the NRC.

The inspection of the isolation zones and protected areas for proper and sufficient illumination should be done during hours of darkness. Sufficient illumination should be provided at access control points to permit examination and verification of identification documents, bills of lading and any other documents that may need to be examined to authorize access. Portable and low or curb level illumination, as well as the traditional high level illumination source should be provided to facilitate searches of vehicles. "Worst case" situations, such as dense cloud cover (generally) and shaded areas (specifically) should be introduced to the inspection when present. A sufficient number of readings, particularly in "darker" areas, should be taken to satisfy the inspector that the minimum required levels of illumination are provided.

All sources of light as well as all related equipment having an effect on the luminosity of the source should be checked for any conditions or factors that would reduce the effectiveness of the system (e.g. dirty light bulbs, dirty or clouded reflectors, etc.). Simultaneously, the inspector should check the ability of assessment (surveillance) aid equipment (e.g., CCTV) to function optimally within the range of illumination being provided. Note: use of CCTV may require more than the minimum 0.2 fc illumination specified by 73.55(c)(5).

The inspector should determine that the licensee's records of testing for illumination are the result of properly performed procedures. The individual responsible for testing should hold the light meter horizontal at ground level and avoid the interference of other factors, such as shadows and reflectors of light.

## SECTION IV
## ASSESSMENT CRITERIA QUESTIONS

1.0 Illumination Assessment

- 1.1 Does facility appear to have adequate lighting without voids?
- 1.2 Is illumination sufficient at access points for examination of badges, documents, etc.?
- 1.3 Is illumination of the perimeter barrier sufficient to permit visual surveillance of both sides of the barrier?
- 1.4 Is illumination of protected area sufficient for CCTV assessment of intrusion alarms?
- 1.5 Is illumination sited to eliminate blinding of CCTV cameras throughout their field of view?
- 1.6 Is illumination spectra compatible with CCTV camera tubes used?
- 1.7 Does lighting hardware appear to be sufficiently weatherproofed?

2.0 Backup Power

- 2.1 Is backup power provided for the illumination system?
- 2.2 What is delay time from primary power failure to full application of backup power?
- 2.3 Is backup power adequate to maintain load?

3.0 Maintenance Records

- 3.1 What is maintenance interval?
- 3.2 What is maintenance procedure?
- 3.3 What maintenance information is recorded?
- 3.4 Are lenses and lamps cleared often enough to maintain intensity?

## SECTION V
## COMPLIANCE CRITERIA

1.0 Illumination Measurement

1.1 Use a calibrated light meter to measure illumination. Measurements should only be taken from 1.5 hours after sunset to 1.5 hours before sunrise.
1.2 Determine that no illumination voids exist and that the minimum illumination is at least 0.2 footcandles to meet the requirements of 10 CFR 73.55(c)(5).
1.3 Determine that illumination at access points is sufficient for examination of badges, documents, etc. to meet the requirements of 10 CFR 73.55(c)(5).
1.4 Determine that illumination is sufficient to permit visual surveillance of either side of the perimeter barrier per 10 CFR 73.55(c)(4).
1.5 Determine that illumination of the protected area is sufficient to permit CCTV assessment of the existence of threats per 10 CFR 73.55(h)(4).
1.6 Determine that weatherproofing of the illumination system will prevent degradation or failure of the lighting hardware.

2.0 Backup Power

2.1 Determine that backup power is provided for the illumination system.
2.2 Measure delay time from primary power failure to full application of backup power. This time should be less than 30 seconds.
2.3 Determine that power capacity of backup power system is sufficient to maintain illumination system power load.

3.0 Maintenance Records

3.1 Determine that the illumination maintenance program is operational and is adequate to sustain an illumination system meeting the requirements of 10 CFR 73.55(c)(5), 73.55(c)(3), 73.55(c)(4) and 73.55(h)(4).

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## SECTION VI
## TECHNICAL CONSIDERATIONS
## (Outline only)

1.0 Light Meter

- 1.1 Calibration Schedule
- 1.2 Traceability of calibration to NBS
- 1.3 Measurement techniques to maximize measurement accuracy.

2.0 Lamp Spectral Characteristics (Text and Graphics)

- 2.1 Lamps should be chosen to match spectral characteristics of CCTV camera tubes.
- 2.2 Sodium Vapor Lamps
- 2.3 Mercury Vapor Lamps
- 2.4 Tungsten Lamps
- 2.5 Fluorescent Lamps

3.0 CCTV Camera Spectral Response Characteristics (Text and Graphics)

- 3.1 Vidicon
- 3.2 Nuvicon
- 3.3 Silicon Diode Array

## SECTION VII
## ENVIRONMENTAL AND ADVERSARY CONSIDERATIONS
(Outline only)

1.0 Weatherproofing

- 1.1 Illuminator Housings
- 1.2 Power System

2.0 Sufficient Over-Intensity Provided to Overcome Effects Of:

- 2.1 Rain
- 2.2 Snow
- 2.3 Blowing dust/sand
- 2.4 Fog

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## SECTION VIII
## APPLICABLE REGULATIONS, REG. GUIDES AND DOCUMENTS

Reference 1 10 CFR 73.55

(c)(5) (5) Isolation zones and all exterior areas within the protected area shall be provided with illumination sufficient for the monitoring and observation requirements of paragraphs (c)(3), (c)(4), and (h)(4) of this section, but not less than 0.2 footcandle measured horizontally at ground level.

(c)(3) (3) Isolation zones shall be maintained in outdoor areas adjacent to the physical barrier at the perimeter of the protected area and shall be of sufficient size to permit observation of the activities of people on either side of that barrier in the event of its penetration. If parking facilities are provided for employees or visitors, they shall be located outside the isolation zone and exterior to the protected area barrier.

(c)(4) (4) Detection of penetration or attempted penetration of the protected area or the isolation zone adjacent to the protected area barrier shall assure that adequate response by the security organization can be initiated. All exterior areas within the protected area shall be periodically checked to detect the presence of unauthorized persons, vehicles, or materials.

(h)(4) (4) To facilitate initial response to detection of penetration of the protected area and assessment of the existence of a threat, a capability of observing the isolation zones and the physical barrier at the perimeter of the protected area shall be provided, preferably by means of closed circuit television or by other suitable means which limit exposure of responding personnel to possible attack.

Reference 2 SPER Chapter 4, Section 4.3

4.3 ILLUMINATION AND SURVEILLANCE

Acceptance Criterion 4.3.A: Illumination shall be maintained throughout the protected area including the top and sides of all

accessible structures. A structure shall be judged accessible if it is less than 18 feet in height or ready means is provided for access to the roof, such as ladders or climbing bars. The minimum level of illumination shall be 0.2 footcandle measured horizontally at ground level.

Source: 73.55(c)(5) (Staff interpretation of the requirement for lighting buildings based upon military guidelines.)

Objective: Assure that there are no dark areas or shadows in the protected area which could hide a crouching man from detection by the naked eye.

Acceptance Criterion 4.3.B: If systems are provided for surveillance of the protected area, capability shall be provided for transmission of equivalent surveillance data to the central and secondary alarm stations.

Source: 73.55(a) (Staff requirement based upon need to prevent false assessment by insider in central or secondary alarm station.)

Objective: Assure accurate assessment cannot be subverted by an insider.

Review Procedures:

Security Plan Review:

A) Confirm a commitment by the licensee to provide 0.2 footcandle of illumination throughout the protected areas.

B) Confirm that a commitment to use surveillance systems to survey that portion of the protected area outside the isolation zone includes the display of the surveillance data in both the central and secondary alarm stations.

Reference 3 American National Standard Practice
RP-10 A85.1-1956 Revised 1970

(To be inserted later)

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APPENDIX B

# OUTLINE OF
# INSPECTOR'S GUIDE TO
# PHYSICAL PROTECTION EQUIPMENT

# Inspector's Guide to Physical Protection Equipment

1.0 Introduction.

Purpose and use of the guide.

2.0 Category.

Six separate sections separated into categories shown in Fig. B-1. Each category heading will contain:

2.1 Description and tables giving characteristics common to the category, as applicable.

2.2 Tables showing general effects of environment and adversary action on FAR and P.D. where applicable.

3.0 Class.

Each category will be separated into classes as shown in Figs. B-2 through B-7. Each class heading will contain:

3.1 Description and tables giving characteristics common to the class, where applicable.

3.2 Expanded table showing effects of environment and adversary action on FAR and P.D. for the class.

4.0 Type.

Each class will be separated into types as shown in Figs. B-2 through B-7. Each type heading will contain:

4.1 Description and tables giving characteristics common to the type.

4.2 Specific tables showing effects of environment and adversary action on FAR and P.D. for the type.

4.3 Tables giving manufacturer-and-model-specific differences from common characteristics, and individual characteristics.

4.4 Recommended testing procedures.

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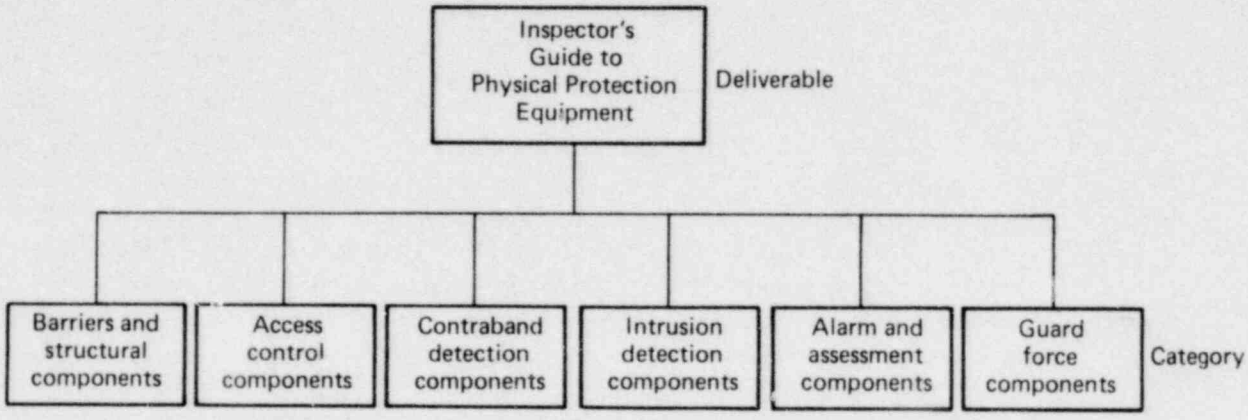


FIG. B-1. Major categories: Inspector's Guide to Physical Protection Equipment.

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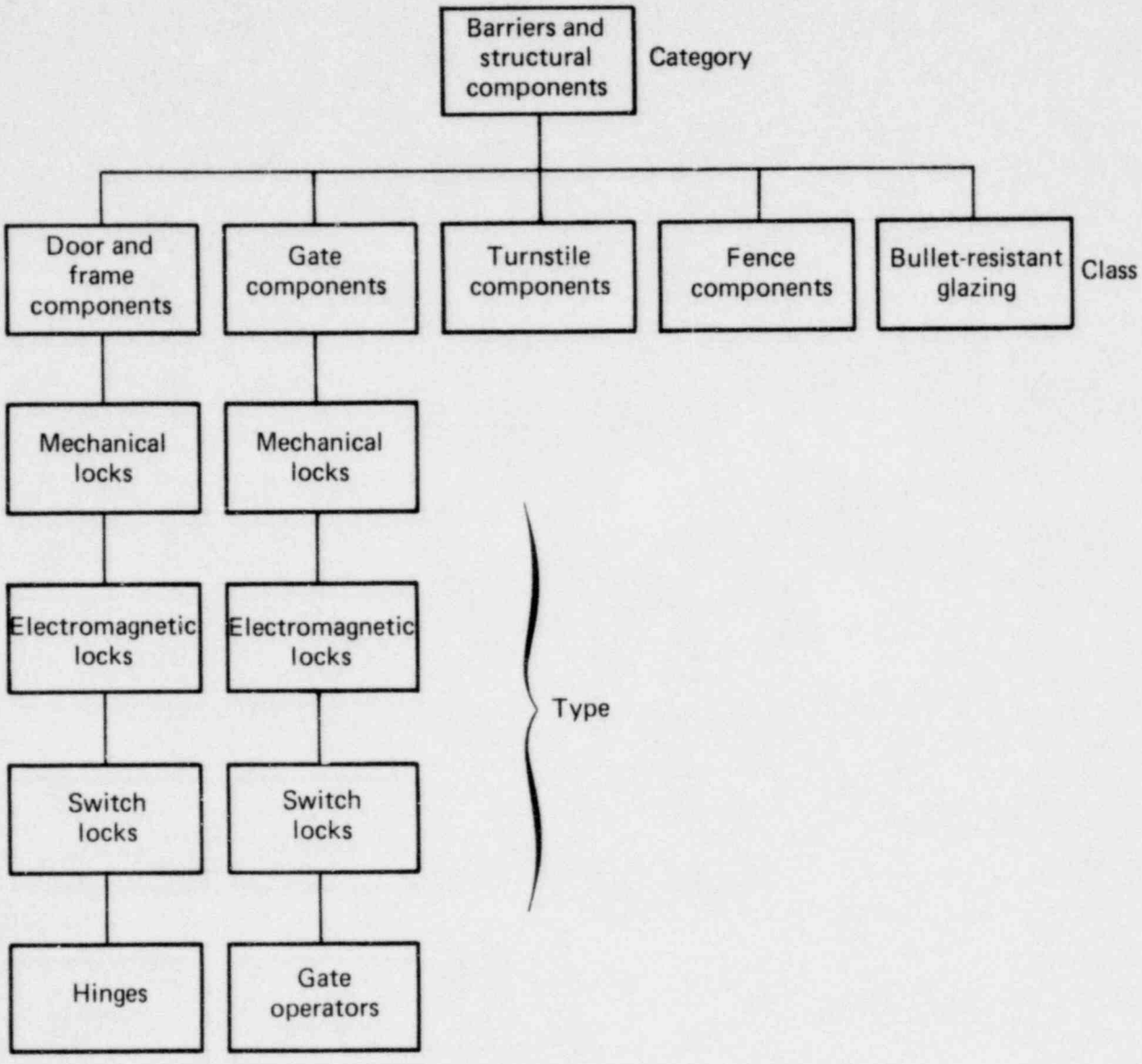


FIG. B-2. Barriers and structural components: Class and type.

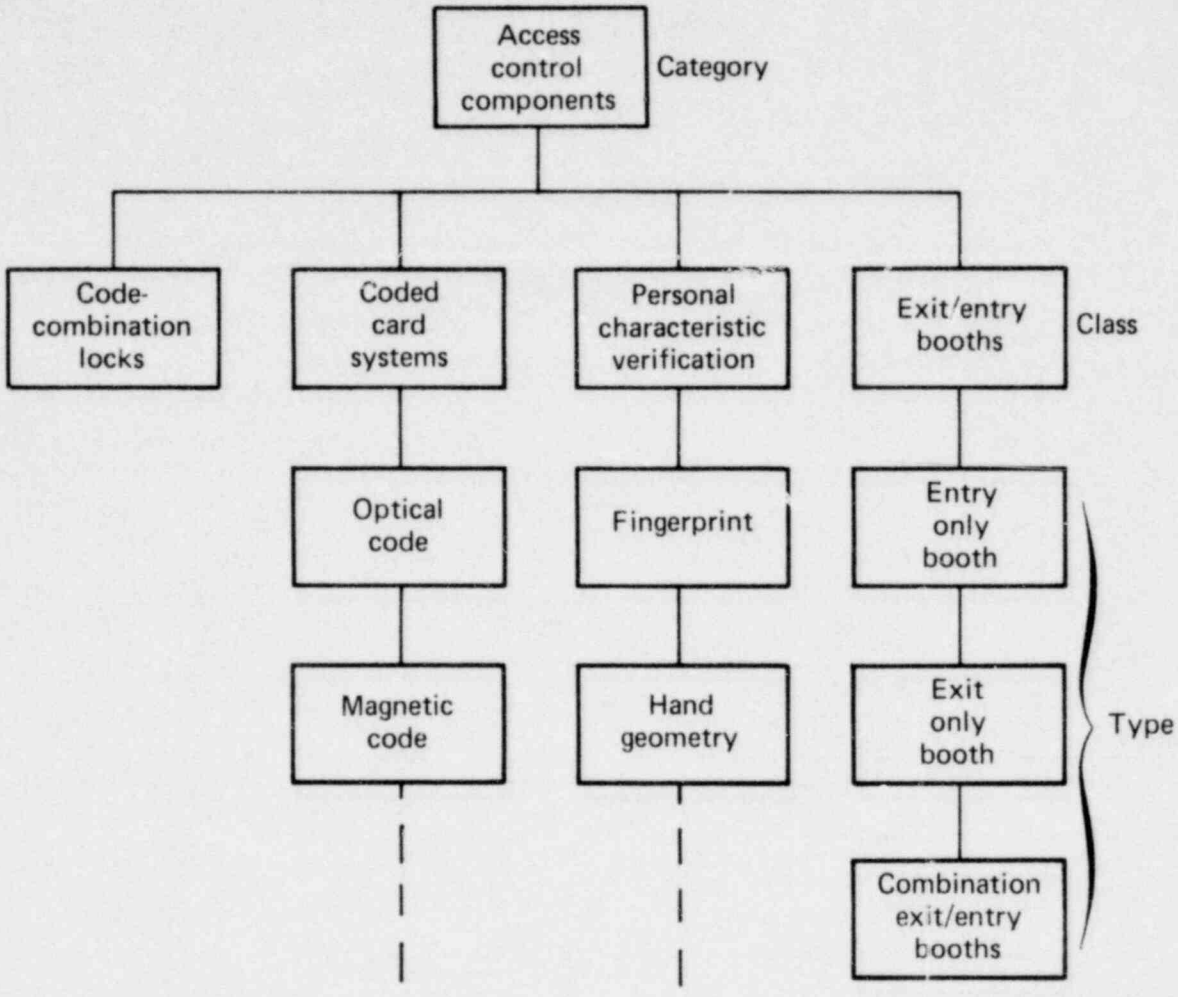


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FIG. B-3. Access control components: Class and type.

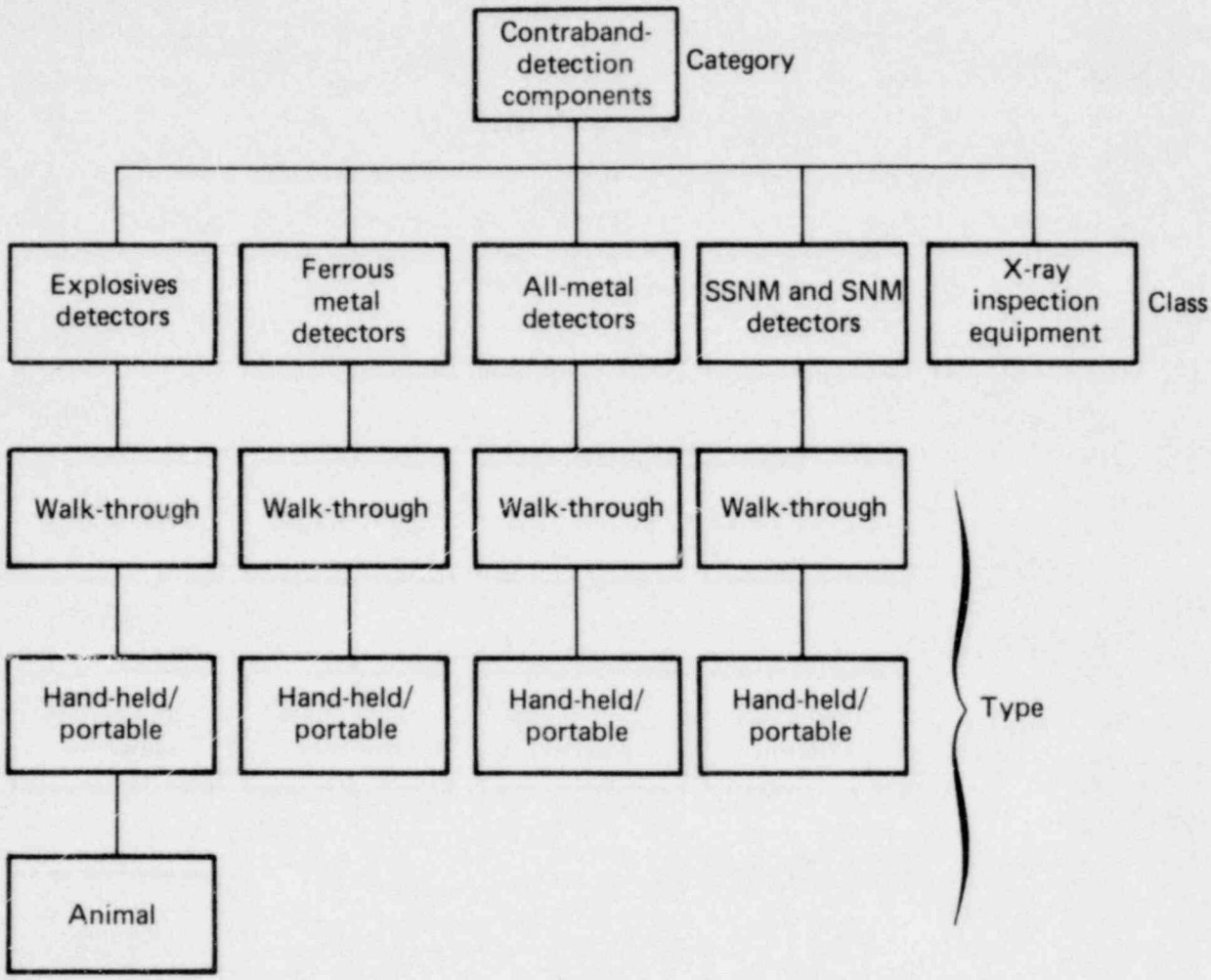


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FIG. B-4. Contraband detection components: Class and type.

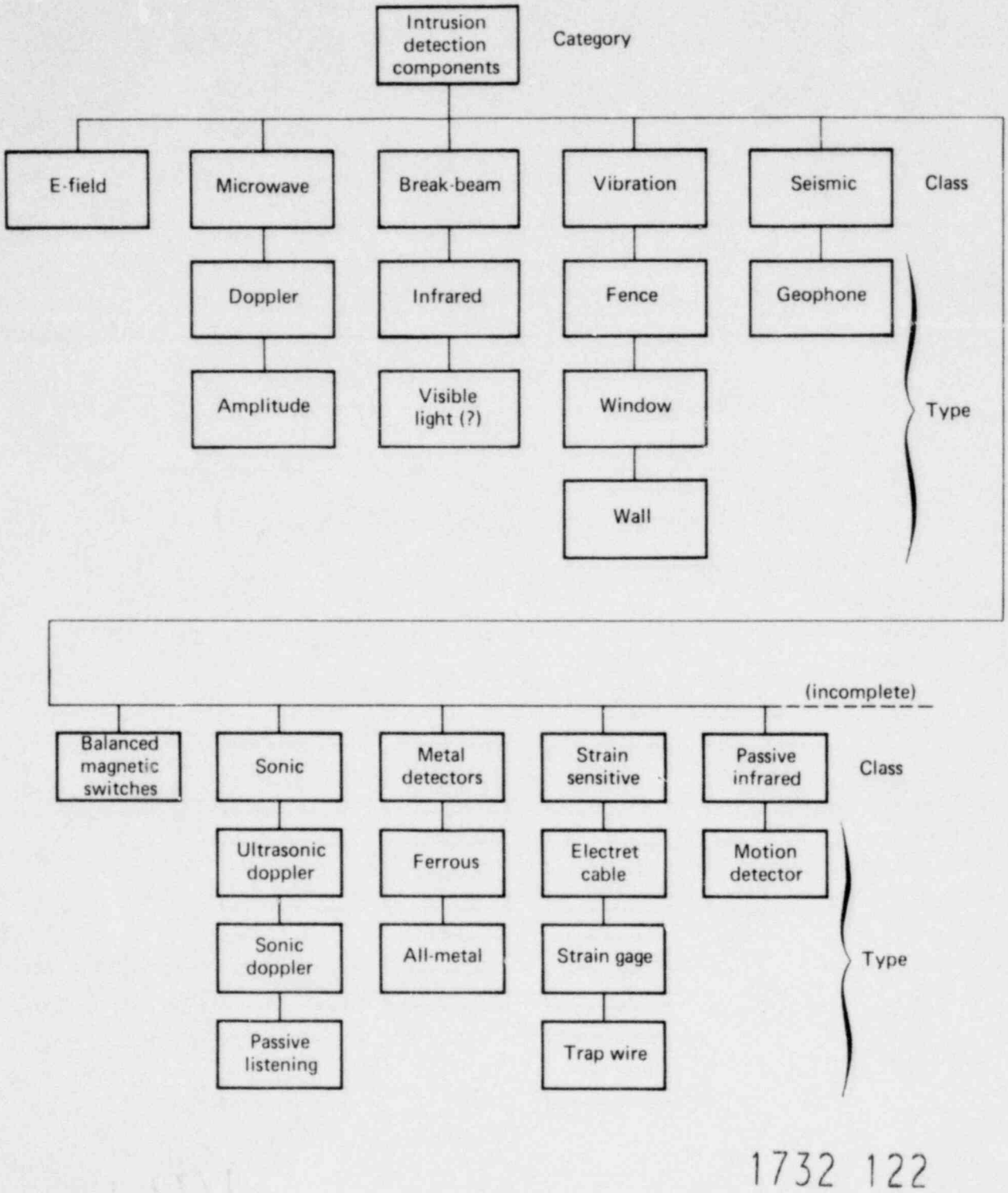


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FIG. B-5. Intrusion detection components: Class and type.

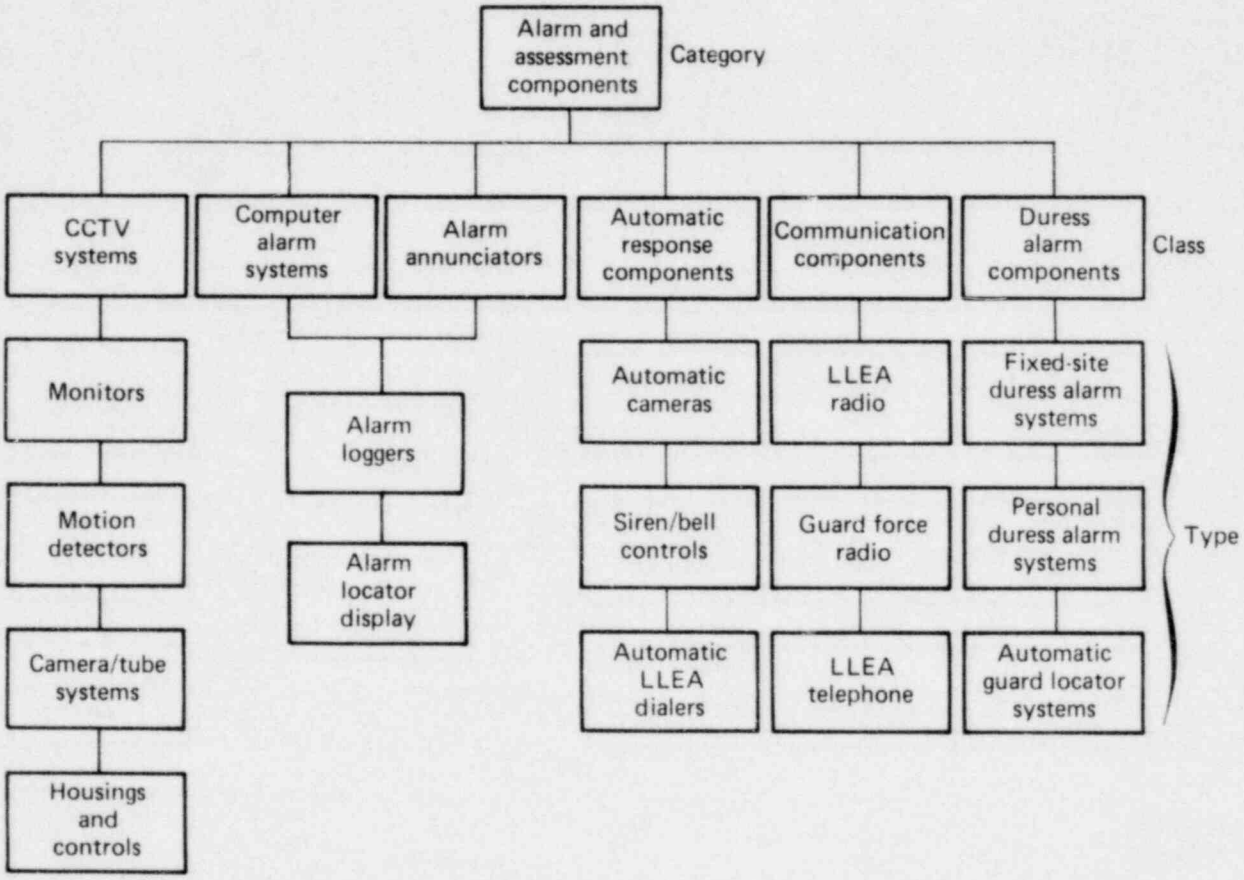


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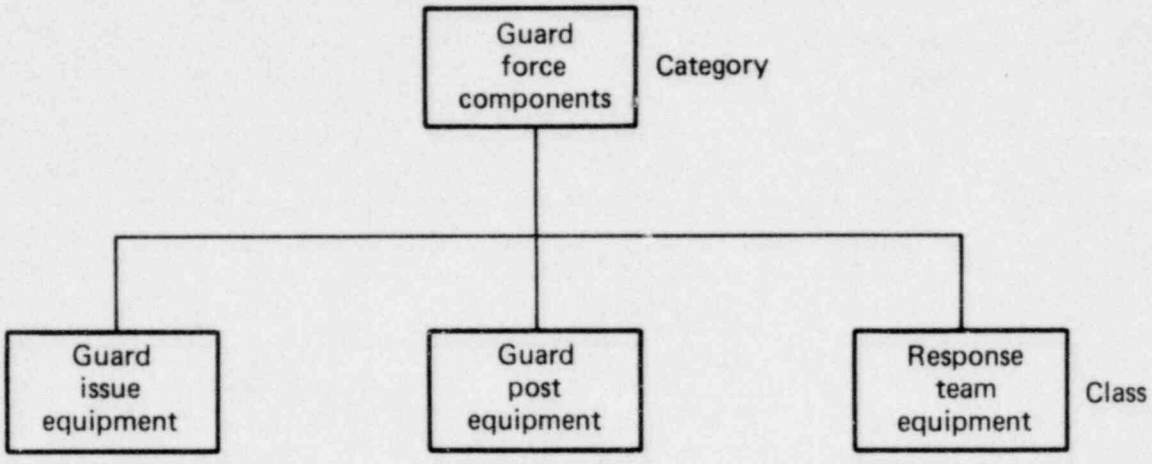
FIG. B-6. Alarm and assessment components: Class and type.




Note: This category is nebulous until we get input from the site-specific equipment inventory and a go-ahead from NRC.

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FIG. B-7. Guard force components: Class.

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